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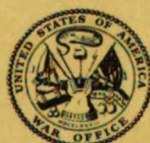


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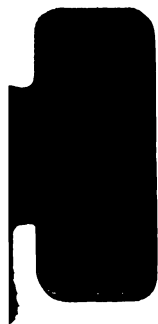
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ARMY MESS OPERATIONS



HEADQUARTERS, DEPARTMENT OF THE ARMY
AUGUST 1967



TECHNICAL MANUAL }

No. 10-405

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., 23 August 1967**ARMY MESS OPERATIONS**

	Page
CHAPTER 1. INTRODUCTION	2
2. GARRISON MESSING	
SECTION I. GENERAL	4
II. BUILDINGS	5
III. EQUIPMENT	6
IV. DUTIES AND RESPONSIBILITIES OF PERSONNEL	7
V. SAFETY	10
VI. MESS ADMINISTRATION AND ACCOUNTING	13
VII. INSPECTION AND STORAGE OF SUBSISTENCE	19
VIII. OPERATIONS AND PROCEDURES	27
IX. MESS INSPECTIONS	36
X. TRAINING OF PERSONNEL	39
CHAPTER 3. FIELD MESSING	
SECTION I. GENERAL	41
II. REAR AREA MESSING	41
III. FORWARD AREA MESSING	51
CHAPTER 4. RAILWAY KITCHEN CAR OPERATIONS	
SECTION I. GENERAL	63
II. ISSUE AND DISPOSITION OF EQUIPMENT	63
III. KITCHEN BAGGAGE CAR	64
IV. ISSUE AND TURN-IN OF SUBSISTENCE AND RELATED SUPPLIES	76
V. ACCOUNTING PROCEDURES	79
VI. SERVING AND SANITATION	81
CHAPTER 5. DESERT, TROPICAL, AND ARCTIC FEEDING	
SECTION I. DESERT FEEDING	83
II. TROPICAL FEEDING	84
III. ARCTIC FEEDING	86
APPENDIX A. REFERENCES	91
B. DISHWASHING, DISINFECTING, AND STAIN-REMOVING PROCEDURES	93
C. FIELD RANGES, STOVES, AND HEATERS	99
D. FIELD EXPEDIENTS	123
INDEX	143

*This manual supersedes TM 10-405, 27 September 1962, including C 1, 28 April 1964; TM 10-206, 6 March 1961, including C 2, 23 January 1963; TC 10-7, 28 July 1964; and TB QM 39, 5 March 1962.

CHAPTER 1

INTRODUCTION

1. Purpose and Scope

a. This manual is for the use of mess officers, mess stewards, cooks, and other persons concerned with the operation of garrison messes, field messes, and kitchen cars. The manual also contains information on desert, tropical, and arctic feeding.

b. Appendix A is a list of pertinent references. Appendix B describes the dishwashing procedures to be followed in garrison and field messes. Appendix C contains information on the operation of field ranges and various stoves and heaters used in the field. Appendix D contains directions for the construction and use of various field expedients.

2. Recommended Changes

Users of this manual are encouraged to submit recommended changes or comments to improve the manual. Comments should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be forwarded direct to the Commandant, U.S. Army Quartermaster School, Fort Lee, Va., 23801.

3. The Army Food Program

a. The Department of the Army has established the Army food program to help commanders at all echelons maintain high standards in all phases of food service. Specific objectives of this worldwide program are as follows:

- (1) To provide an adequate variety, quantity, and quality of subsistence for troop feeding and to maintain the highest possible dietary standards for the soldier.
- (2) To provide adequate facilities and operating personnel for the receipt,

inspection, storage, and issue of subsistence; for the sale of food and household supplies; and for the preparation and serving of food.

- (3) To provide continuous training for the personnel required to support the program.

b. Commanders at all levels are responsible for achieving the objectives of the food program. Commanders must make sure that the best qualified and trained personnel available to the command are used in the food program and that close supervision is exercised over all food facilities down to and including consumer levels.

c. At all levels, the food adviser is responsible for helping the commander to achieve the objectives of the food program. The food adviser plans and coordinates the food service program of the command and exercises technical supervision over the food service activities of the command.

4. Kinds of Rations

a. *Field Ration A.*

- (1) Field ration A, the basic ration of the Army is composed of fresh foods so far as possible and also includes frozen, canned, and dehydrated foods. This ration is issued in kind—that is, actual food items are issued and no monetary credits are allowed. In CONUS, the meals served and the food items issued are those specified in SB 10-260, as amended by the installation menu board. Oversea commands may develop their own master menu or use the CONUS master menu.
- (2) Field Ration A is used in all Army feeding facilities operated from appropriated funds except in the cadet

mess of the U.S. Military Academy; in messes on Army harbor boats and other small craft; in messes of units, organizations, and activities specifically excepted by the Department of the Army; and in messes at fixed Army medical treatment facilities. Messes at fixed Army medical treatment facilities are operated in accordance with AR 40-2. Troops in the other excepted messes are subsisted on the monetary allowance ration (b below).

b. *Monetary Allowance Ration.* The monetary allowance ration and field ration A are essentially the same in components, methods of storage, preparation, and service. However, the monetary allowance ration differs from the field ration in that the monetary allowance ration is purchased by the using unit. The amount of the allowance is determined by the unit's present-for-duty strength, the number of days in the ration period, and the current cost of the basic components of the ration. The basic components of the ration are given in AR 31-200. Menus for the monetary allowance ration are prepared by the mess steward, subject to the commander's approval.

c. *Operational Rations.* An operational ration is composed of nonperishable foods and is prescribed for individuals performing operational duty in time of war or other emergency. Operational rations are used in peacetime for emergencies, travel, or training, or for rotating stocks; they may also be used when refrigeration is not available.

- (1) *Standard B ration.* The standard B ration is designed for large group feeding and is used in areas where cooking facilities are available but where refrigeration facilities are not. Components of this ration are as nearly like those of field ration A as possible except for the substitution of food items requiring no refrigeration. The standard B ration menu (SB 10-495) provides a 15-day menu of nonperishable foods.
- (2) *Other operational rations.* Other operational rations, such as the individual combat meal, the frigid trail individual ration, the general-purpose survival food packet, and the long-range patrol subsistence packet, have been developed for use by individuals or small groups and are described in DA Pam. 30-1.

CHAPTER 2

GARRISON MESSING

Section I. GENERAL

5. Field Ration Messes

There are four types of field ration mess: unit, consolidated, officer, and transient. The categories of personnel authorized to subsist in each type of field ration mess are specified in AR 30-41. This regulation also specifies which categories of personnel are entitled to subsist at government expense and which categories are required to reimburse the government for meals consumed.

6. Meal Rates

a. Persons who are required to reimburse the government for their meals are charged the meal rates specified in AR 30-30. These meal rates, which apply to field ration and monetary allowance ration system messes in CONUS and overseas, are established in three basic categories: rates for personnel required to pay food costs but not surcharge (operating costs); rates for officers and civilians not receiving a per diem allowance; and rates for officers and civilians in a travel status and receiving a per diem allowance. Personnel in the last two categories pay food costs and surcharge.

b. Examples of personnel required to pay food costs but not surcharge are as follows:

- (1) U.S. military enlisted personnel receiving monetary allowances in lieu of rations in kind.
- (2) Officers and civilians in unusual or extraordinary circumstances (for example, when present in a combat area; when participating in maneuvers, field exercises, or training in the field,

if meals are not prepared and served in an established messhall; under emergency conditions of disaster or civil disorder; or during troop movements by motor convoy or troop train).

- (3) Foreign enlisted personnel as specified in AR 30-30.
 - (4) Army National Guard and Army Reserve officers undergoing training in summer camp, when subsisted in the field rather than in established messhalls.
 - (5) Officers and civilians on duty, when required by the nature of their duties to subsist with the troops.
 - (6) Food advisory personnel receiving monetary allowances in lieu of rations, when required to be present in a mess at mealtime.
 - (7) Contract civilian mess attendants, when the contract does not include the cost of the surcharge payment.
 - (8) ROTC students, when subsisted in a government mess.
- c. Examples of personnel required to pay food costs and surcharge are as follows:
- (1) Officers and civilians other than those shown in b above.
 - (2) Army National Guard and Army Reserve officers undergoing field training in summer camp, when subsisted in an established mess.
 - (3) Foreign officers as specified in AR 30-30.

7. Responsibility

The responsibility for messhalls is divided between the engineer and mess personnel.

a. Engineer. The repairs and utilities division is responsible for the following:

- (1) Constructing additions and making alterations to mess buildings according to specifications which have been approved by the U.S. Army Food Service Center.
- (2) Maintaining and repairing buildings, structures, and utilities requiring anything more than minor work. The utilities to be serviced are water, electricity, gas, plumbing, and heating.
- (3) Instructing permanent mess personnel in the proper action to take in the event of emergencies. Specific points to be emphasized are as follows:
 - (a) *Electrical system.* Mess personnel should know how to connect simple electrical equipment, such as mixing machines, vegetable peeling machines, and meat-cutting machines, and, as a safety precaution, how to cut off the power in case of fire or a short circuit.
 - (b) *Gaslines.* In messes using gas, it is important that mess personnel know where and how to shut off gas, both for individual items of equipment and for the main line.
 - (c) *Water and plumbing systems.* Mess personnel should know the location of all fire hose outlets and the method of hose attachment and operation. The location and operation of all valves in the piping system must be known so that the water can be shut off in case a pipe bursts or a serious leak occurs.
 - (d) *Steam and hot water piping.* Mess personnel should be able to shut off the steam and hot water systems in case of emergency and should understand the operation of any safety valves in the system.
 - (e) *Heating system.* Mess personnel should have sufficient knowledge of

the operation of the heating system of the mess building to be able to shut it down in an emergency.

b. Mess Personnel. Mess personnel are responsible for the following:

- (1) Performing organizational repair and preventive maintenance.
 - (a) Oiling door hinges and springs.
 - (b) Cleaning screens and light fixtures.
 - (c) Keeping floors and other parts of the mess building clean.
- (2) Reporting all building defects and utility defects (gas, water, electricity, plumbing, and heating) to the repairs and utilities division.
- (3) Defrosting built-in mechanical refrigerators. Mess personnel should be able to shut down the equipment in emergencies. All other refrigerator maintenance is performed by repairs and utilities division personnel.

8. Buildings and Utilities

Mess personnel should be familiar with the main structural features of the mess building as well as with the location of all utilities. Such knowledge of the setup of the building is useful in daily operation of the mess and is extremely important in emergencies such as fire, a major breakdown of utilities, or damage caused by enemy action. To learn the location of all utility systems and their emergency shutoff points, mess personnel should make a close inspection of the building and study the floor plans and all utility diagrams. Whenever possible, copies of the building plans and blueprints should be obtained from the repairs and utilities division and kept on file for reference.

9. Building Security

The mess steward is responsible to the mess officer for the security of the building and the property in the building. He must see that all storage facilities of the mess are locked when they are not in use and that all windows are fastened and doors locked when the mess is not occupied. He must exercise strict control over his complete set of mess keys to prevent their falling into the hands of unauthorized persons. Some members of the mess staff should have

possession of certain keys during the day's operations; for example, storeroom keepers should have keys to the storerooms. The mess officer should keep a complete set of duplicate keys. These keys can be kept conveniently in a key locker mounted on the wall of his office. An identification tag should be attached to each key. Whenever locks are changed, the key locker must be brought up to date. The key locker should be locked at all times, and only

the mess officer or mess steward should have a key to open it. The key to the locker should be available at all times while the mess is in operation. If the mess officer and mess steward are absent from the mess at the same time, the key to the key locker should be given to the person next in charge. In this way, access is always provided to all spaces in the building in case of emergencies such as fire or a break in a heating or plumbing line.

Section III. EQUIPMENT

10. Basis for Issue

The equipment authorized for use in garrison messes is specified in TA 50-911. Allowances of expendable supplies are contained in TA 50-986.

11. Operation and Maintenance

a. The repairs and utilities division personnel are responsible for direct support maintenance of kitchen mess equipment. They determine the serviceability and repairability of the equipment.

b. Mess personnel are responsible for the following operator maintenance and inspection of kitchen equipment:

- (1) Cleaning and caring for the equipment as outlined in TM 10-415.
- (2) Making daily checks and inspections of equipment to insure good working condition and also to make certain that the equipment is not being used beyond safe operating limits.
- (3) Reporting to repairs and utilities division personnel any damage, deterioration, or improper functioning of the equipment because of fair wear and tear or accidental damage. If any item of mess equipment fails to give satisfactory service because of a defect in design, construction, or operation, the trouble should be reported through technical channels on DA Form 2407 (Maintenance Request). Photographs or sketches of the equipment, if available, should be attached to the form. When this procedure is

followed, much of the information needed for making modifications and improvements in the design and construction of mess equipment is provided.

- (4) Making sure that all personnel who use mess equipment know how to operate it and how to perform such preventive maintenance as is required. Regardless of prior training, all operators of mess equipment should be instructed in the proper operation of the equipment when they are first assigned to duty. It is the duty of supervisory mess personnel to check frequently to see that operators are following instructions properly. Both school and on-the-job training should be made available to all mess personnel. Technical manuals, manufacturers' instructions, and posters may be used for instructing personnel in the mess.
- (a) Technical manuals provide operating and preventive maintenance instructions for standard mess equipment. Each mess should maintain a complete file of publications pertaining to the equipment installed in the kitchen, and each member of the permanent mess staff should become familiar with the contents of TM 10-415.
- (b) Manufacturers' instruction manuals or pamphlets accompany many pieces of mess equipment. This in-

structional material gives the standard procedure for operating the equipment and outlines the inspections and periodic services that must be performed to keep the equipment in good working condition.

- (c) Posters aid in teaching proper operation and maintenance of equipment. Enlarged reprints of some of the operator's instruction sheets and preventive maintenance performance charts contained in technical manuals may be obtained through normal publications channels. These posters should be placed near the appropriate machine so that the operator can see the instructions.

12. Replacement

The mess steward must be familiar with the expendable and nonexpendable items for the mess that are available through supply channels and with the procedures for obtaining supplies and equipment from the appropriate supply officer. Together, the mess officer and mess steward should prepare a plan for the replacement of equipment. Some commanders require that all requisitions for initial and replacement food service equipment be screened by the installation food adviser before they are accepted by the installation supply officer for further supply action. Commanders are responsible for providing the installation food program with sufficient monetary credit to purchase items required for efficient mess operation.

Section IV. DUTIES AND RESPONSIBILITIES OF PERSONNEL

13. Commanding Officer

The unit or organization commander is responsible for the proper feeding of the troops in his command, for the proper operation of the mess, and for making adequate inspections of all aspects of mess operations. He must exercise close supervision over the mess to insure that the highest standards of food service and sanitation are being maintained. He must make certain that an adequate number of mess personnel are assigned and that the personnel are properly trained, that the proper number of meals is being received in the mess, and that all subsistence supplies issued to the mess and the food prepared from the supplies are being conserved and controlled. The commanding officer or his officer representative must consume one meal in the mess each day to determine the quantity and quality of the food being served.

14. Mess Officer

The mess officer is the appointed representative of the commanding officer. He supervises the operation of the messing facilities within a command. If the mess officer is in charge of a unit mess, he will frequently have other assigned duties; however, if he is assigned a consolidated mess, he will usually devote full

time to management duties. Because the mess officer works through the mess steward, he does not manage the cooks and other mess personnel directly. He is the liaison officer between the mess steward, who represents the immediate management of the mess, and the commanding officer, who must fit the mess operation into his overall command work. The mess officer's diversified responsibilities are very closely related to the health and morale of the troops in the organization or unit. He must be well qualified for his position and interested in his assignment. His duties and responsibilities are as follows.

- a. Obtains the required subsistence, equipment, and supplies necessary for operating the mess and feeding the troops.

- b. Makes frequent inspections of the mess to see that all subsistence is properly stored according to its perishability; that the menu is being followed and that only authorized substitutions are made; that the cooks' worksheet is carefully followed for details of preparation, cooking, and serving; that leftovers are kept to a minimum and used to the fullest extent; that all mess equipment is properly maintained and used; that all phases of sanitation are enforced; and that stored food is not spoiled.

c. Institutes methods of food conservation and prevents the accumulation of excess food items.

d. Inspects the serving line to see that foods are being served attractively; samples prepared foods to determine their palatability.

e. Encourages all mess personnel to further their training and to improve their performance on the job. Supervises on-the-job training programs for mess personnel.

f. Supervises the keeping of supply and equipment records and mess accounts. With regard to supervision of mess accounts, the mess officer should do the following.

- (1) Inspect the headcount operation to insure that persons detailed to this duty are following correct procedures (counting properly, completing forms properly, charging correct cash rates, etc.)
- (2) Perform detailed inspection of DA Form 2970 (Subsistence Report and Field Ration Request) to insure accuracy and completeness. He should make sure that strength figures are furnished the mess by the first sergeant, that only the number of meals actually required and authorized is requested; and that all personnel subsisted are reported in the proper columns of the report. Also, he should prevent unsupported meals and prevent (or eliminate when necessary) overdrawn or underdrawn meals.
- (3) Insure that cash for meals is properly collected, recorded, safeguarded, and turned in.
- (4) Insure that unauthorized personnel are not subsisted.

g. Requests the assistance of the food adviser on mess matters when necessary or desirable.

h. Cooperates with the food adviser during his mess visits to insure that problems are resolved.

i. Prepares an equipment replacement plan and initiates timely action to obtain replacement.

15. Mess Steward

The mess steward is the keyman in the mess organization. He is responsible to the mess

officer for the operation and control of the mess. He is in charge of every detail of mess operation, but he delegates specific supervision and operation to others. The detailed duties and responsibilities of the mess steward are listed below.

a. Supervises the actual preparation, cooking, and serving of food.

- (1) Inspects serving lines to determine the quantity and quality of food being served.
- (2) Determines troop acceptability of food items and makes recommendations to the food adviser on proposed changes to the menu.
- (3) Takes all necessary steps to insure the proper use of food and the elimination of food waste.
- (4) Switches perishable items when necessary to prevent spoilage.

b. Prepares cooks' worksheet. Evaluates the ability of each cook to determine the extent to which the cooks must be instructed on the cooks' worksheet or in other written instructions.

c. Establishes operating and working procedures for cooks and other kitchen personnel and prepares written SOP's. Knows the amount of manpower required for the various duties in the mess and assigns duties as necessary for the successful operation of the mess.

d. Holds daily meetings with mess personnel to discuss the preparation, cooking, and serving of food; problems concerning the mess; and ways to improve overall operation.

e. Instructs mess personnel and supervises the instruction provided by other members of the mess staff.

f. Makes recommendations for promotion and assignment, as well as for training. Develops subordinates for future positions of mess responsibility.

g. Prepares headcount SOP and carefully instructs persons detailed to this duty.

h. Is responsible for receiving, storing, accounting for, and turning in cash from meals sold and the cash meal payment book (sheets). Must insure that only authorized persons are allowed to consume food in the mess and that all are properly reported.

i. Inspects mess personnel for cleanliness.

j. Insures that the mess building, equipment, and area are kept in a sanitary condition.

k. Is responsible for mess security (building, equipment, food, and cash).

l. Checks appliances and equipment frequently, reports shortages, and recommends necessary repairs; furnishes the mess officer with information for the equipment replacement program.

m. Reports all breakage promptly to the mess officer to enable him to establish responsibility.

n. Estimates the number of meals required and prepares the ration request.

o. Prepares and maintains the mess account, records, and related reports.

p. Studies bulletins, technical manuals, and other printed material relating to mess operations.

q. Plans the food service part of special unit events and festivities. Assigns additional personnel to work on these special functions.

r. Inspects all mess operations for satisfactory results.

s. Maintains order in the mess at all times.

16. Assistant Mess Steward

When an assistant mess steward is authorized, he works directly under the mess steward in supervising mess operations. The division of duties between the mess steward and his assistant is determined by the mess officer and the mess steward. The assistant usually assumes the responsibilities of the mess steward when the latter is off duty. In large messes, or in messes requiring a shift that must operate beyond regular duty hours, the assistant carries a shift. In some instances, a second assistant mess steward may be assigned. The qualifications for the assistant mess steward are the same as those for the mess steward.

17. Cooks

The primary duty of all cooks is to prepare, cook, and serve food. Naturally, the cook must know how to prepare a wide variety of foods in small or large quantities, using standard Army recipes and cooking equipment. It is the cook's responsibility to see that the food he prepares meets the highest standards of nutrition, taste, and attractiveness. Cooks are also responsible for much of the immediate on-the-

job training of the cooks' helper. The first cook is in direct charge of the kitchen and of the other cooks and all other food service personnel assigned to him. When the mess steward and assistant mess steward are absent from the mess, the first cook assumes the duties and responsibilities of that office. To assume these added responsibilities, the first cook should have had adequate training and experience. The cooks' detailed duties are as follows:

a. Study the cooks' worksheet to insure timely preparation of meals.

b. Follow the recipes exactly when preparing each food item and observe the proper cooking times and temperatures required for the various foods.

c. Prepare the correct quantities of food carefully and strive diligently to have an adequate amount for the meal without waste or leftovers.

d. Use authorized leftovers promptly to prevent waste.

e. Schedule the work of assistants and train them in the performance of their duties.

f. Observe the rules of personal hygiene, messhall sanitation, and safety when preparing food.

g. Check kitchen utensils often to be sure that they have been cleaned and returned to their proper places after use.

h. See that the messhall is in order; that all windows and doors are secured; that foods are properly stored; and that lights, except low-wattage night lights in the kitchen, are turned off before the messhall is closed at night.

Note. Night lights must be left on in the kitchen as a safety precaution. The early shift arrives in the messhall before daylight; if the kitchen is dark, the person who opens the building may try to provide light by striking a match. If gas fumes have escaped during the night, an explosion may occur when the man strikes the match.

18. Cooks' Helper

A cooks' helper is assigned to the mess under the overall supervision of the mess steward. The mess steward is responsible for the on-the-job training of the cooks' helper and assigns him specific duties with the cooks or other supervisory mess personnel. Duties of the cooks' helper may be to slice meat; to store rations; to wash, peel, cut, and dice fruits and vegetables; to operate mechanical equipment;

to serve predetermined portions of food from the serving line; and to clean equipment, preparation area, and utensils as directed.

19. Kitchen Police

Kitchen police are provided on a roster basis at the minimum rate of two for a mess serving 50 or fewer persons per meal, and one for each additional 50 persons, or major fraction thereof, served. The duties of kitchen police may be divided into six main groups which will serve as the basis for assignment of duties. In a small mess two or more of these duties may be assigned to one man; in a large mess it may be necessary to detail several men to each duty. The main duties of kitchen police are listed below; however, other duties may be assigned by the mess steward and cooks.

- a. Clean and maintain storerooms.
- b. Prepare fruits and vegetables for cooking.
- c. Clean the dining room and kitchen.
- d. Wash dishes or trays and tableware; operate the mechanical dishwasher.
- e. Wash pots, pans, and all cooking utensils.
- f. Collect and dispose of all waste material.

20. Headcounters

Enlisted personnel are detailed to each mess-hall as headcounters. One headcounter is detailed at each entrance through which diners pass. Regularly assigned mess personnel and personnel below the grade of E-4 must not be detailed as headcounters. Headcounters must be instructed in their duties (para 30b) before the start of the meal by either the mess officer or the mess steward.

Section V. SAFETY

21. General

Safety in the mess may be termed "commonsense in action." If mess personnel will use a little commonsense when performing their respective duties, many accidents will be prevented and the number of man-hours lost each year because of mess accidents will be greatly reduced. Each mess should have a clearly defined safety program with which all mess personnel are thoroughly familiar. The functions of a safety or accident-prevention program are to correct unsafe acts of working personnel and to correct unsafe mechanical or working conditions.

22. Safety Measures

Following are the five areas of mess operations in which accidents are most likely to occur, together with some recommended safety measures.

a. *Handling of Food Supplies.* Handling food supplies is not easy or light work because foodstuffs are received in many sizes and types of containers. Kitchen personnel doing this work are likely to suffer strains unless they know how to lift heavy objects. Also, there are the dangers of falling when reaching for something on a high shelf and of picking up splinters or being cut or scratched when opening a container. The improper stacking of goods is an-

other cause of accidents. To reduce these hazards, mess personnel should follow the commonsense practices listed below.

- (1) Teach kitchen personnel the proper method of lifting, stressing the following points:
 - (a) Get a firm grip on the container.
 - (b) Get a firm footing with body weight evenly distributed.
 - (c) Bend knees, keep back straight, and make sure that the load is close to the body.
 - (d) Use thigh and shoulder muscles and lift the load.
 - (e) Use a normal walking gait and make sure that you can see where you are going.
 - (f) Ease load to its resting place.
- (2) See that a strong, well-braced ladder is provided for removing all items from shelves over 6 feet high.
- (3) See that shelving is strong and well designed, in good repair, and free of splinters and loose nails.
- (4) Stack goods safely, placing heavy foodstuffs on lower shelves.
- (5) Store insecticides, cleaning materials, and other contaminants in a separate room away from the storeroom.
- (6) Keep aisles in storeroom clear of ob-

structions and make sure that the storeroom is well lighted.

- (7) Wear work gloves when opening wooden cases. Remove all protruding nails and dispose of empty cases promptly.

- (8) Keep storeroom floors clean and dry.

b. *Preparation of Foods.* The preparation of foods includes such diverse operations as peeling and dicing vegetables, slicing meats, and mixing doughs and batters. To perform these kitchen duties, mess personnel must use various types of knives and operate mechanical equipment, such as vegetable peeling machines, meat-slicing machines, and mixing machines. To guard against cuts and falls as well as occasional serious injuries sustained when using mechanical equipment, kitchen personnel should heed the following safety precautions:

- (1) *Knives.*

- (a) Keep knives sharp.
- (b) Use the right knife for the job.
- (c) Cut away from the body.
- (d) Never "palm" vegetables and fruits and then attempt to cut through them.
- (e) Keep knives in racks when they are not being used.
- (f) Never leave a sharp-edged tool lying loose on a worktable; it might be covered up with vegetables or other foods, becoming a hazard to the person cleaning up the table.
- (g) Never try to catch a falling knife; always step back and let it fall.
- (h) Never place knives in the sink for the KP to wash; this practice is not only dangerous but will also ruin the wooden handles. The person who has just used a knife should clean it and place it on the rack.
- (i) Never carry knives when hands are full.
- (j) Never use knives to open cans.

- (2) *Mechanical equipment.*

- (a) Instruct kitchen personnel in the proper operation of all mechanical equipment.
- (b) Plan work intelligently to avoid overloading the equipment.
- (c) Do not allow operator to leave the equipment when it is in operation.

- (d) Put safety guards in place and be sure that they are in good condition.
- (e) Keep hands and utensils out of the mixing bowl when the mixing machine is in operation. Always shut off the switch on the machine when scraping down or removing the bowl or when changing attachments.
- (f) Allow only qualified persons to install or make repairs on mechanical equipment.
- (g) See that all worn or frayed electrical cords are replaced. The cords to all electrical kitchen equipment should be of the three-wire self-grounding type.

- (3) *Work area.* To prevent slipping or falling, always keep floors free of vegetables, fruits, or other spilled or dropped foods. Keep floors as clean and dry as possible.

c. *Cooking and Baking.* In this phase of mess operations, burns and falls are two types of accidents that occur frequently. Hot handles, steam kettles, ranges, ovens, and spattering fat all contribute their share of burns. To guard against these accidents, kitchen personnel should follow these safety practices:

- (1) Be thoroughly familiar with each piece of kitchen equipment.
- (2) Turn handles of cooking utensils parallel to the front of the range and never allow the handles to protrude into the aisle.
- (3) Use dry pads when handling hot utensils.
- (4) Avoid crowding the cooking surface of the range, making sure that no utensils are balanced on the edge of the cooking surface.
- (5) Know where containers of hot food are to be placed before removing them from the range.
- (6) Never stand in front of the oven door when opening it. Close oven doors properly and be sure not to slam them.
- (7) Clean up spilled foods promptly, thereby eliminating a source of slips and falls.
- (8) See that hot steampipes are covered with asbestos to prevent contact burns.
- (9) Be alert at all times, and be particu-

larly attentive when working around ovens, steamtables, deep-fat fryers, and all mechanical food service equipment.

d. Serving. Burns, collisions, and falls are common types of accidents that occur where food is being served. Unnecessary hurrying, coupled with lack of attention, may cause kitchen personnel to collide and spill hot food on themselves and on others. Minor spillages often go unnoticed until someone slips and falls. Careless mopping of floors and the wearing of rundown heels may also cause falls. To avoid falls, mess personnel should follow these safe practices:

- (1) Have IN and OUT swinging double doors between kitchen and dining room so that personnel coming into the kitchen will not have to cross the path of those leaving. If only one door can be used, see that a window glass is installed in the door.
- (2) Avoid running and unnecessary hurrying when bringing hot food replacements for the steamtable. Give proper warning before passing behind servers.
- (3) Learn to change steamtable inserts properly to avoid steam burns. Always lift the near side of the insert enough to allow the insert to clear the opening; then slide the insert toward the rear, allowing the steam to rise harmlessly at the far end of the insert being removed.
- (4) Clean up all spillage promptly.
- (5) Keep shoe heels in good condition.

e. Table Clearing and Dishwashing. The chief injuries that occur during table clearing and dishwashing are strains, falls, and cuts. To avoid these injuries, mess personnel should practice these safety precautions:

- (1) Make sure that trays are not overloaded or improperly stacked.
- (2) Do not use fingers to pick up broken glass and dishes: sweep up the pieces.
- (3) Wash glasses with proper brush.
- (4) Wash glasses, china, and silverware separately.
- (5) Drain sink at once when a glass is

broken in wash or rinse water; then remove the broken glass with a cloth.

- (6) Keep working area around sinks dry. Wash and dry duckboards or mats daily and more often if necessary.

23. Fire Prevention

Fire hazards can be eliminated with a well-organized fire prevention program. Such a program should include the following safety precautions:

- a.* Store clean and dirty rags in separate fireproof containers. Dispose of greasy rags immediately after use.
- b.* Clean exhaust fans, ducts, and filters regularly.
- c.* Never use flammable fuels for cleaning purposes.
- d.* Do not permit unqualified personnel to tamper with wiring.
- e.* See that all switchbox covers are closed.
- f.* Do not place highly flammable materials close to light bulbs.
- g.* Shut off gas valves on lines not in use. Using a soapy solution and brush, check for gas leaks in pipes or joints. When the mess has been closed for as long as several hours, open windows or doors and ventilate the building before lighting gas ranges.
- h.* Make sure that all decorations are approved by the installation fire marshal.
- i.* See that grease on range hoods is kept at a minimum and that the filters are cleaned at least once a week and more often if necessary.
- j.* See that the appropriate fire extinguishers are in their proper place and are in apparent good order with seals unbroken. See that locations of fire extinguishers are well marked.

Note. All fire extinguishers are inspected at least annually by the installation fire department and the inspection date and condition annotated on the inspection tag. These tags must be attached to each extinguisher and must be dated and initialed on each monthly visual inspection.

- k.* Hold frequent fire drills and train personnel in selecting the proper extinguisher to use for the various types of fires. Impress upon personnel that first aid fire extinguishers are an expedient and not a substitute for calling the fire department each time a fire occurs.

Section VI. MESS ADMINISTRATION AND ACCOUNTING

24. General

Unless otherwise noted, the forms and procedures discussed in this section pertain only to field ration messes. Administrative and accounting procedures for monetary allowance ration system messes are covered in AR 30-42 and AR 31-200.

25. Requests for Rations and Receipt of Supplies

A field ration mess usually receives its subsistence supplies from an Army source—commissary, ration breakdown point, or supply point operated by a TOE supply and service unit. In CONUS, the ration interval (the lapse of time between the submission of the ration request and the consumption of the rations) and the weekly ration issue frequency (the scheduled number of times and the sequence within a week that rations are issued) are established by the commissary officer at each installation; overseas, they are established by the officer who performs the functions of the commissary officer. When a field ration mess receives its subsistence supplies from a Navy or Air Force source under an interservice support agreement, rations are requested and delivered in accordance with local procedures. The procedures outlined in this paragraph pertain only to field ration messes which receive their supplies from Army sources.

a. Preparation of Ration Request. The mess steward uses Section B, DA Form 2970 to request rations.

Note. For other uses of DA Form 2970, see paragraph 29.

- (1) Because the field ration is issued on a meal basis, the mess steward must estimate the number of persons he expects to be present at each meal during the period covered by the ration request and base the number of meals he requests on his estimate. He should use the record of meal attendance on the cooks' worksheets (para. 26) on file in his office as a guide in preparing his estimate in addition, he should take into consideration known troop increases or decreases, attachments and detachments, and leaves. Also, it

may be necessary for him to compensate for overdrawn meals (para. 27c).

- (2) Before preparing the ration request, the mess steward must check the supplies on hand in the mess against the issue charts in the master menu for the days for which he is requesting rations and order only the supplies he needs. There is space on DA Form 2970 for deleting or reducing the quantity of items to be issued.
- (3) If the unit or organization is served directly by the commissary, at least two copies of the ration request must be prepared—one to be forwarded to the commissary and one to be retained by the mess. If the installation has an Army bread bakery, a central meat processing facility, or a central pastry kitchen, one additional copy must be prepared for each central facility.
- (4) If the unit receives its supplies from a ration breakdown point, two copies of the ration request are prepared. One copy is forwarded to the ration breakdown point, where it is consolidated with other unit ration requests, and the consolidated ration request is forwarded to the commissary. The other copy is retained by the mess. The ration breakdown point prepares a strength sheet, listing the individual meal strengths for each unit, in sufficient copies to allow one copy for the commissary and, where applicable, one for each central facility.

b. Receipt of Supplies. The forms used in the delivery of subsistence supplies and the various sources of supply are discussed below. The quantities authorized are based on the allowances per 100 persons specified in the master menu and on the number of meals requested on the ration request. Before food items are accepted at the mess, they must be checked by the mess steward or a member of the permanent mess staff for quantity or weight and inspected for condition. (In this connection, see para. 33.)

- (1) Most subsistence supplies are delivered to the mess on DA Form 10-260

(Field Ration Issue Slip) which is prepared by the commissary or ration breakdown point, as appropriate. Perishable and nonperishable supplies are listed on separate forms because they are delivered from different warehouses. A copy of DA Form 10-260 is retained by the mess. Forced issues and emergency issues of perishable subsistence are discussed in paragraph 33.

- (2) Messes receive their accessory items and condiments from one of two sources.

(a) Where there is a self-service accessory food and condiment center, the mess receives a monetary allowance for the purchase of these supplies. The mess forwards a copy of DA Form 2970 to the condiment center. The condiment center maintains a customer ledger account card for each mess, and the account card is receipted after each purchase by authorized personnel. The mess cannot purchase more condiments in any accounting period than are authorized by the monetary allowance.

(b) Where there is no self-service accessory food and condiment center, accessory items and condiments, as listed in the master menu, are issued according to the field ration issue schedule prepared by the commissary officer or, in oversea areas, by the officer who performs the functions of the commissary officer. These items are issued on DA Form 10-260 or on DA Form 3161 (Request for Issue or Turn-In).

- (3) In some cases supplies such as bread or dairy products are purchased locally and are delivered to the mess by the vendor, either on DA Form 10-47 (Order and Receipt for Direct Vendor Delivery) or on individual delivery tickets. The unit mess officer authorizes certain persons to sign for supplies delivered by the vendor and completes DA Form 1687 (Notice of Delegation of Authority—Receipt for

Supplies) which he forwards to the commissary officer. Only persons authorized by the mess officer are allowed to sign for supplies delivered directly by the vendor. If the vendor delivers the supplies on DA Form 10-47, the authorized receiver enters the exact quantity delivered and writes his full name and organization in the appropriate spaces on the form. If the vendor delivers the supplies on an individual delivery ticket (minimum of three copies), the authorized receiver signs all tickets and retains one for the mess records.

- (4) Where there is an Army bread bakery, bread is issued by the bakery on DA Form 10-47. Only persons authorized by the mess officer ((3) above) may sign for the bread.

(5) Where there is a central pastry kitchen, pastry products are delivered by the central pastry kitchen on DA Form 10-261 (Pastry Issue Slip). The pie pans, sheet pans, and delivery cabinets used in the previous day's delivery must be returned to the deliveryman at the time the pastries are issued and a notation made on the form.

- (6) Where there is a central meat processing facility, meats are delivered to the mess on DA Form 2732 (Meat Processing Facility Issue Slip).

26. Use of Cooks' Worksheet

a. The Cooks' Worksheet (DA Form 3034-series) is prepared by the mess steward and is used to provide mess personnel with instructions for the preparation of meals and the utilization of leftovers. It is also used to compute and record the meal status (number of meals overdrawn or underdrawn) of the mess. The cooks' worksheet consists of three sheets—one sheet for each meal. DA Form 3034 is used for breakfast. DA Form 3034-1 is used for dinner and contains space in which the mess steward and first cook can list topics to be discussed at the mess steward's daily meeting (para. 37a). DA Form 3034-2 is used for supper and also for computing the meal status of the mess (para. 27).

b. Directions for filling out the cooks' worksheet are contained in AR 30-41. The information provided on each page includes the following:

- (1) Menu items listed in master menu (as adjusted by the installation or command menu board) and leftovers from previous meals to be served.
- (2) Name of cook who is to prepare each item.
- (3) Number of portions to be prepared.
- (4) Size of portions to be served.
- (5) Recipe to be used (from TM 10-412-series or master menu notes) or number of SOP to be followed when no recipe is required.
- (6) Special instructions to cooks.
- (7) The time to start cooking each item.
- (8) Disposition of leftovers.
- (9) Information on preparation of box lunches when required (number to be prepared, menu, and time lunches are to be ready).
- (10) Other information not provided elsewhere.

c. AR 30-41 also contains instructions for calculating quantities of ingredients to be used when more or less than 100 portions must be prepared. If the mess steward desires, he may calculate the quantities of ingredients required and write the adjusted quantities in the space provided on the back of each page.

d. Cooks' worksheets must be retained in the mess for 3 months after the end of the accounting period or until the quarterly review of accounts has been made.

27. Control of Overdrawn Meals

a. When preparing DA Form 3034-2, the mess steward enters the number of meals to be prepared and the number of meals drawn (from DA Form 10-260). The two numbers do not necessarily agree. When the meal is over, he enters the number of persons actually fed (para. 30c). The difference between the number of meals drawn and the number of persons served is the number of meals overdrawn or underdrawn (the meal status of the mess).

b. Throughout the accounting period, the mess steward keeps a running total of breakfasts, dinners, and suppers overdrawn or underdrawn. Both over and under issues must

be carried forward into the next accounting period and the number of overdrawn meals eliminated within 10 days if possible, or at least by the end of the new accounting period.

c. To compensate for overdrawn meals, the mess steward must reduce the number of meals requested on ration requests; yet he must make sure that sufficient food, in the quantity and variety shown in the master menu, is available to subsist personnel. The mess steward must coordinate the method of reducing overdrawn meals with the food adviser having staff supervision over his mess.

28. Disposition of Excess Supplies

If excess nonperishable subsistence items accumulate even though the mess steward deletes or reduces the quantity of items to be issued when he prepares his ration request (para. 25a), the excesses must be turned in twice a month. Excess supplies are turned in to the commissary or ration breakdown point, as appropriate, on DA Form 3122 or 3161, (Request for Issue or Turn-In). Excess perishable subsistence must be substituted for nonperishable items on the menu and consumed as soon as is practicable.

29. Use of DA Form 2970 (Subsistence Report and Field Ration Request)

Directions for preparing DA Form 2970 are contained in AR 30-46. Units which have field ration messes and which receive their supplies from Army sources use the form not only to request rations (para. 25a) but also to report strengths, headcount, and other feeding data. Units which receive subsistence support from other services and units which are subsisted on the monetary allowance ration use the form to report data as required by AR 30-46. File copies of DA Form 2970 must be retained for a period of 3 months or until the quarterly review of accounts has been made.

30. Headcount and Meal Cash Collection Procedures

a. Issuance of Meal Cards.

- (1) The commander of a unit or organization operating a field ration mess issues a Meal Card (DD Form 714) to each enlisted person who is entitled to subsist in the mess at government expense. When an enlisted person who

has been issued a meal card departs on TDY or leave or when he is no longer entitled to rations in kind because of a change in status, his meal card is withdrawn.

- (2) Meal cards are also issued to foreign military personnel when reimbursement for meals is accomplished at installation or major command level and to officers, warrant officers, and enlisted personnel who reimburse the government for their meals through payroll deduction.
- (3) Replacement stream personnel and students on TDY at service schools may be issued meal cards, but the expiration date of the card must be entered in the upper left corner of the card.
- (4) Personnel engaged in basic or advanced training at Army Training Centers may be issued serially numbered reusable meal cards. The procedure is as follows:
 - (a) As required, meal cards may be over stamped as outlined in AR 30-41.
 - (b) Meal cards will be prenumbered serially by the unit commander.
 - (c) The unit will maintain a register of all prenumbered meal cards and the name of the person to whom each card is issued.
 - (d) DD Forms 714 will be withdrawn from enlisted personnel possessing such cards upon separation from the unit or upon completion of the training cycle.
 - (e) Commanders will insure that DD Forms 714 are withdrawn from enlisted personnel when a change in status no longer entitles them to subsistence in kind.
 - (f) DD Form 714 will not be issued to enlisted personnel who are receiving a basic allowance for subsistence.
- (5) The meal cards of personnel other than enlisted personnel of the Active Army who are authorized to subsist at government expense—for example, foreign military personnel and officers,

warrant officers, and enlisted personnel as described above, or members of the Navy, Air Force, Army Reserve, ROTC, and National Guard—are over stamped to identify the component, service, or program from which reimbursement is required (AR 30-41).

b. Duties of Headcounter. The duties of the headcounter (para. 20) are to—

- (1) Check the identification of every person who enters the messhall and make sure that only authorized persons are allowed to enter.
- (2) Count all individuals who enter the messhall and enter the count on DA Form 3033 (Headcount Record) (c below). The count must include mess personnel, kitchen police, persons eating early or late meals, and persons who have been issued box lunches. (The number of box lunches issued can be obtained from the cooks' worksheet.)
- (3) Collect cash for meals from all persons who are required to reimburse the government in cash and maintain DD Form 1544 (Cash Meal Payment Sheet). Persons who have a meal card (a above) are not required to pay for their meals. All others except transient enlisted personnel, who are identified through travels orders, are required to pay. The use of DD Form 1544 is described in paragraph 31.

Note. If a cash register is used in the mess, the cash meal payment sheet is not kept. Procedures to be followed when a cash register is used are discussed in detail in AR 30-41.

- (4) Maintain DA Form 3032 (Mess Guest Register) as required (d below).

Note. In oversea commands, the headcounter may also be required to maintain other forms to record meals consumed on a reimbursable (other than by the individual) basis. For example, certain persons in oversea commands are permitted to eat in U.S. messes but reimbursement is made at higher levels. In such cases, these persons must sign a local form which is maintained by the headcounter.

c. Use of DA Form 3033. DA Form 3033 is used to record the total number of persons fed at each meal and the information necessary to effect reimbursement, when required, from other services, components, or programs. When

a mess serves meals simultaneously at two or more locations, DA Form 3033 must be maintained at each location. The form has one column each for breakfast, dinner, and supper. It provides space for the headcounter to record separately the number of persons in various categories (for example, Army Reserve, National Guard, Active Navy, or Navy Reserve) who are present in the mess for a particular meal. At the conclusion of the meal, he enters the total headcount and writes his name and grade in the block provided in the appropriate meal column. When a midnight meal is served (*e* below), the appropriate meal column is divided and the headcount recorded as for other meals. All entries on the form must be made in ink and all copies of the form retained in the mess for 3 months or until the quarterly review of accounts has been made.

d. Use of DA Form 3032. DA Form 3032 is used mainly in transient messes but there are occasions when it is used in other messes. Guests (for example, enlisted personnel making an official visit or inspection) and transients who are entitled to rations in kind and who consume a meal in the mess are required to sign the register and to enter their grade or rank, organization, and component or department. Whether or not transients are entitled to rations in kind is established by their travel orders or other official identification. When a group of transients is subsisted, a one-line entry showing the number of persons in the group may be made by the senior member of the group. However, this entry must be supported by a separate roster or a copy of appropriate orders listing all personnel subsisted, and the list of personnel must be attached to DA Form 3032.

e. Use of DA Form 3035. When it is necessary for the mess to serve midnight meals (para. 38*d*), DA Form 3035 (Night Meal Pass) is used to identify persons who are authorized the meal. Passes, which must be numbered in advance, are signed by the unit commander and are issued daily to persons who cannot be present for the regularly scheduled meal. The headcounter must collect a pass from each person who consumes a midnight meal and must also determine if reimbursement is required. The unit must maintain a register of all night meal

passes, and the mess must return all passes to unit headquarters daily.

31. Use of DD Form 1544

a. DD Form 1544 (Cash Meal Payment Book) is an accountable form used to record cash payments for meals in monetary allowance ration system messes and in field ration messes. Each book contains 50 serially numbered cash meal payment sheets and a register for recording the dates of issue and turn-in of the individual sheets and the amount of cash collected on each sheet.

b. The mess draws DD Form 1544 from a consolidating headquarters or directly from the designated control officer. Detailed procedures are contained in AR 30-41. One individual must be designated on DA Form 1687 to receive and sign for the book.

c. Each mess is authorized to have one book at a time. However, if the unit has less than 5 day's supply of cash meal payment sheets on hand or if the unit is participating in extended field exercises, the issue of additional books is authorized.

d. DD Form 1544 must be safeguarded in the mess at all times. One or more sheets, depending on the number of cash payments anticipated, are issued to either the mess steward or the headcounter. Before the sheets are issued, the title of the organization, the starting date, and the current rates for food costs and surcharges (AR 30-30) must be entered, and the unit commander or mess officer must sign the sheets. The individual drawing the sheets must sign for them on the register (Cash Meal Payment Sheet Record).

e. Under ordinary circumstances, the headcounter insures that each person who is required to pay cash for his meal writes his name (as normally written), his grade, and the cost of the meal, including surcharge where applicable, in the prescribed columns of the cash meal payment sheet. However, when special groups visit the mess, a one-line entry may be made on the cash meal payment sheet by the escort officer or senior member of the group, provided a roster supporting the entry is supplied. The roster must contain the name and grade of each individual in the group, together with the amount of reimbursement required, and must be signed by the escort officer

CASH MEAL PAYMENT SHEET												SERIAL NO. 4990			
To be completed when the Government is to be reimbursed for meals furnished															
ORGANIZATION OR DINING HALL 511th GENERAL SUPPLY COMPANY FT. SCHOOL, VA.								INCLUSIVE DATES COVERED FROM 23 AUG 19 - THROUGH 24 AUG 19 -							
FOOD CHARGES				SURCHARGES (\$/C)				PER DIEM SURCHARGE							
B	D	S		B	D	S		B	D	S					
.27	.50	.40		.08	.20	.15		.33	.50	.50					
GRADE		NAME		DOLLAR VALUE				GRADE		NAME		DOLLAR VALUE			
				B	D	S	S/C					B	D	S	S/C
03	Richard Mott	.27							BALANCE BROUGHT FORWARD	\$ 1.08	\$ 5.00	\$ 2.00			.88
E8	David Seidel	.27				.08		03	James Finley					.40	.50
E4	Roy Davis	.27						E8	Richard Smith					.40	.15
E5	William Cooper	.27						E5	Paul Winston					.40	
E5	Leslie Holbie		.50					23	August James Cox						E5
E7	Charlie Wallis		.50					03	Frank Bowen	.27					.08
E7	Arnold Jones		.50					E3	Paul Camp	.27					
E5	Walter Mellon		.50					03	Charles Phillips	.27					.08
E3	Will Bradley		.50					E4	James Fisher	.27					
E7	Julian Howard		.50					E3	Charles Black			.50			
E4	Peabody Green		.50					E9	Robert Brown			.50			.20
04	Cy J. Henry		.50			.50		E2	James Mason		.50				
E3	Russell Jones		.50					E2	John Cooke		.50				
E4	Phillip Morris		.50					E8	Russell Boshier		.50				.20
03	Hugh Stockdale			.40	.15			E2	Allen Huett		.50				
E4	George Green			.40				02	Marion F. Posey				.40		
E2	William Jones			.40				E7	Gordon Brown				.40		
E8	Michael Corn			.40	.15			E4	Mason Lee				.40		
E4	Frank Gray			.40					TOTAL	\$ 2.16	\$ 8.00	\$ 4.40			\$ 2.09
TOTAL				\$ 1.08	\$ 5.00	\$ 2.00	\$.88	TOTAL VALUE OF MEALS SOLD (B + D + S)				\$ 14.56			
SIGNATURE OF UNIT COMMANDER OR CONSOLIDATED MESS OFFICER								SIGNATURE OF LAST OR ONLY COLLECTOR							
Harry Harlow, Capt, OMC								John Smith, E5							

SHEET 1

Figure 1. Completed cash meal payment sheet.

or senior member of the group. The roster is attached to the cash meal payment sheet.

f. The cash meal payment sheet is used until all lines have been filled, unless turn-in of funds (para. 32) is required. If, at the end of the headcounter's tour of duty, the sheet has not been filled, he writes his name and the date on the next unused line and turns in the sheet and cash to the mess officer or mess steward. After the last line on the sheet has been used, the headcounter making the collection totals all columns, completes the date block at the top of the page, signs his name in the "Signature of Last or Only Collector" block, and turns in the sheet (fig. 1) and cash to the mess officer or mess steward. Cash meal payment sheets and cash must be safeguarded between meals; if a sheet is used for more than one day, the sheet and the cash must be safeguarded separately from the cash meal payment book.

g. When cash meal payment sheets and cash are turned in to the person issuing sheets from the book, an entry is made on the register (fig. 2). The entry must include the date, the amount of cash collected, and the signature or initials of the person receiving the cash and sheets.

h. When cash is turned in to the consolidating headquarters or to the finance and accounting officer (para. 32), the voucher number of the turn-in or deposit document is entered on the applicable lines of the register.

i. After all sheets in DD Form 1544 have been used and funds have been turned in by the unit or organization operating the mess, the book and applicable deposit documents are turned in to the officer who issued the book (b above) as prescribed in AR 30-41.

32. Turn-In of Cash Collected from Sale of Meals

a. Cash collected from the sale of meals must be turned in when any one of the following conditions exists.

- (1) When cash collections exceed \$200.
- (2) When the installation commander so directs.
- (3) At least once a month and always as of the last day of the commissary accounting period, regardless of the amount of cash on hand.
- (4) When all 50 sheets of DD Form 1544 have been used.

b. Units and organizations which draw DD Form 1544 direct from the control officer turn in cash to the finance and accounting officer on DD Form 1131 (Cash Collection Voucher) as prescribed in AR 30-41.

c. Units and organizations which draw DD Form 1544 from a consolidating headquarters turn in cash to the consolidating headquarters on DA Form 3122 or 3161, as prescribed in AR 30-41.

Section VII. INSPECTION AND STORAGE OF SUBSISTENCE

33. Inspection of Subsistence Upon Receipt in the Mess

a. *Quantity Check.* The quantity check is made by count for items issued by quarts, dozens, packages, etc. When the quantities received are less than the quantities authorized for delivery to the mess, only the units that are received are entered in the appropriate space on the field ration issue slip or such other receipt as may accompany the food when it is delivered. If the quantities received are greater than the quantities authorized, excess quantities are returned to the delivering source of supply. Whenever the quantity check shows that quantities are short, the issuing agency

should be notified immediately so that shortages can be made up before the food is scheduled for preparation.

b. *Weight Check.* The weight check is made for items that are issued in pounds and ounces. In garrison messes, in which platform scales are an item of issue, the weight of the items issued by weight must be checked on the scales before the items are accepted by the mess. Shortages must be indicated on the field ration issue slip or other receipt that may accompany the food; excesses must be returned to the delivering source of supply.

c. *Condition Inspection.* When food is received at the mess, it must be inspected by the

CASH MEAL PAYMENT SHEET REGISTER						SERIAL NO. 4990	
ORGANIZATION				INSTALLATION			
511TH GENERAL SUPPLY COMPANY				FT. SCHOOL, VIRGINIA			
SHEET NO.	ISSUED TO		DATE ISSUED	DATE RE-TURNED	CASH AMOUNT COLLECTED	RECEIVED BY	VOUCHER NO.
	SIGNATURE	ORGANIZATION					
1	Charles J. O'Brien	511TH Gen Sup. Co	23 AUG	24 AUG	16.65	HH	1515
2	Charles J. O'Brien	511TH Gen Sup. Co	24 AUG				
3							
4							
5							
6							
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Figure 2. Register from cash meal payment book.

mess steward or a member of the permanent mess staff for defects such as abnormal shape, color, and odor. If inspection of the food at the time of delivery reveals that there is good reason to believe that the food is unfit for human consumption, the mess steward or other member of the permanent mess staff must make an appropriate notation on the field ration issue slip or other receipt that accompanies the food. The mess steward then requests the veterinarian to inspect the questionable food. If the veterinarian finds the food unfit for consumption, he directs the mess steward to return the food to the delivering source of supply with a request for immediate replacement. Mess personnel should not throw out or otherwise destroy food suspected of being unfit for consumption until so authorized by the veterinarian. If the amount of food rejected by the mess on delivery is of such proportions as to cause an appreciable reduction in the amount of food to be fed to the troops, the consolidating headquarters or other issuing agency should be notified immediately so that replacement or substitution can be made in time to insure preparation of the replacement items for the meal for which they are intended. Forced-issue items (*d* below) may not be rejected. Condition inspection of nonperishable and perishable food may be accomplished in the following manner.

(1) *Nonperishables.*

- (a) *Dry stores.* Dry stores such as cereals or sugar should be inspected for signs of having been exposed to greasy substances or excessive moisture. If the container is discolored, it should be opened for verification of condition. If the condition is unsatisfactory, it may be necessary to reject the entire issue. If the condition is satisfactory, the container should be closed and stored immediately. Containers that are open on receipt should be returned to the source of supply for replacement, unless it is obvious that the containers were opened for purposes of ration breakdown.
- (b) *Canned goods.* Condition inspection of canned goods on receipt is usually limited to visual inspection of the

containers in which the cans are packed. If the containers are crushed or torn open, inspectors should open them and inspect the cans within for punctures or excessive rust. Punctured or excessively rusty cans should be returned to the delivering source of supply, and replacement should be requested. However, when the mess receives a forced issue of canned goods, condition inspection should be in greater detail, because the canned goods issued under these conditions are approaching the limit of their shelf life or have reached it.

(2) *Perishables.*

- (a) *Frozen foods.* When frozen foods are received in the mess, they should be inspected for firmness and for signs of having been thawed and refrozen. If the frozen food package is hard on one side and yields easily to pressure applied to the opposite side, thawing and subsequent refreezing are indicated. Frozen meats should be checked to see that the markings on wrappers and the general shapes of packages indicate that the meats are of the cut and type listed on the field ration issue slip and on the installation menu for the meal and date indicated. Frozen foods must be stored in the frozen food cabinet immediately after inspection.
- (b) *Fresh fruits and vegetables.* Fresh fruits and vegetables must be inspected for mold, rot, and other defects. The good must be separated from the bad and the good refrigerated immediately if refrigeration is required. Shipping containers which have been contaminated by spoiled food items should not be used for storage. Clean containers should be provided for items requiring further storage.
- (c) *Meat, fish, and poultry.* Meat, fish, and poultry must be inspected for odor, color, and the presence of slime. Odor should be mild and

color normal, and there should be no slime. Cuts of meat should be checked to see that they are those listed on the issue slip and on the menu for which they were issued.

- (d) *Milk.* The temperature of the milk delivered to the mess should not be above 45° F. Broken bottles or leaky cartons must be rejected. Bottles and cartons should be free of grease or dirt. Bulk milk containers must be delivered with both seals intact and with all rubber or synthetic parts, such as milk delivery tubes and valves, protected from contamination. After the containers have been inspected, the milk should be refrigerated immediately.

d. *Forced Issues.* When it is necessary for the commissary officer (or, in oversea areas, the officer performing the functions of the commissary officer) to dispose of certain subsistence items to prevent loss to the government through deterioration or spoilage, he makes forced issues. The commissary officer and the food adviser determine the meals at which the items will be served. Forced issues are made on separate field ration issue slips which are marked "forced issues."

e. *Emergency Issues of Perishable Subsistence.* When, in the opinion of the veterinary officer, perishable subsistence supplies on hand are in a condition requiring immediate use, emergency issues are made. After receiving the veterinary officer's statement covering the necessity for emergency issues, the commissary officer (or, in oversea areas, the officer performing the functions of the commissary officer) issues the items to the messes. When necessary, he increases the issue factor to allow for trim loss.

34. Storage of Nonperishables

Nonperishable subsistence, although more durable than perishable subsistence, must nevertheless be stored with care. Improper storage of nonperishables can result in loss from rodent or vermin infestation or from deterioration caused by heat, dryness, or excessive moisture. Correct storage will aid in the proper rotation of nonperishable items such

as condiments and will insure their use on a first-in, first-out basis.

a. *Facilities.* Space for the storage of nonperishables is provided in each unit or consolidated mess. Storerooms should be clean and well ventilated and free of rodents, insects, and foreign odors. The storerooms should be equipped with sufficient shelving for storage of canned or packaged nonperishable items and with dunnage for stacking nonperishable items in cases or bags.

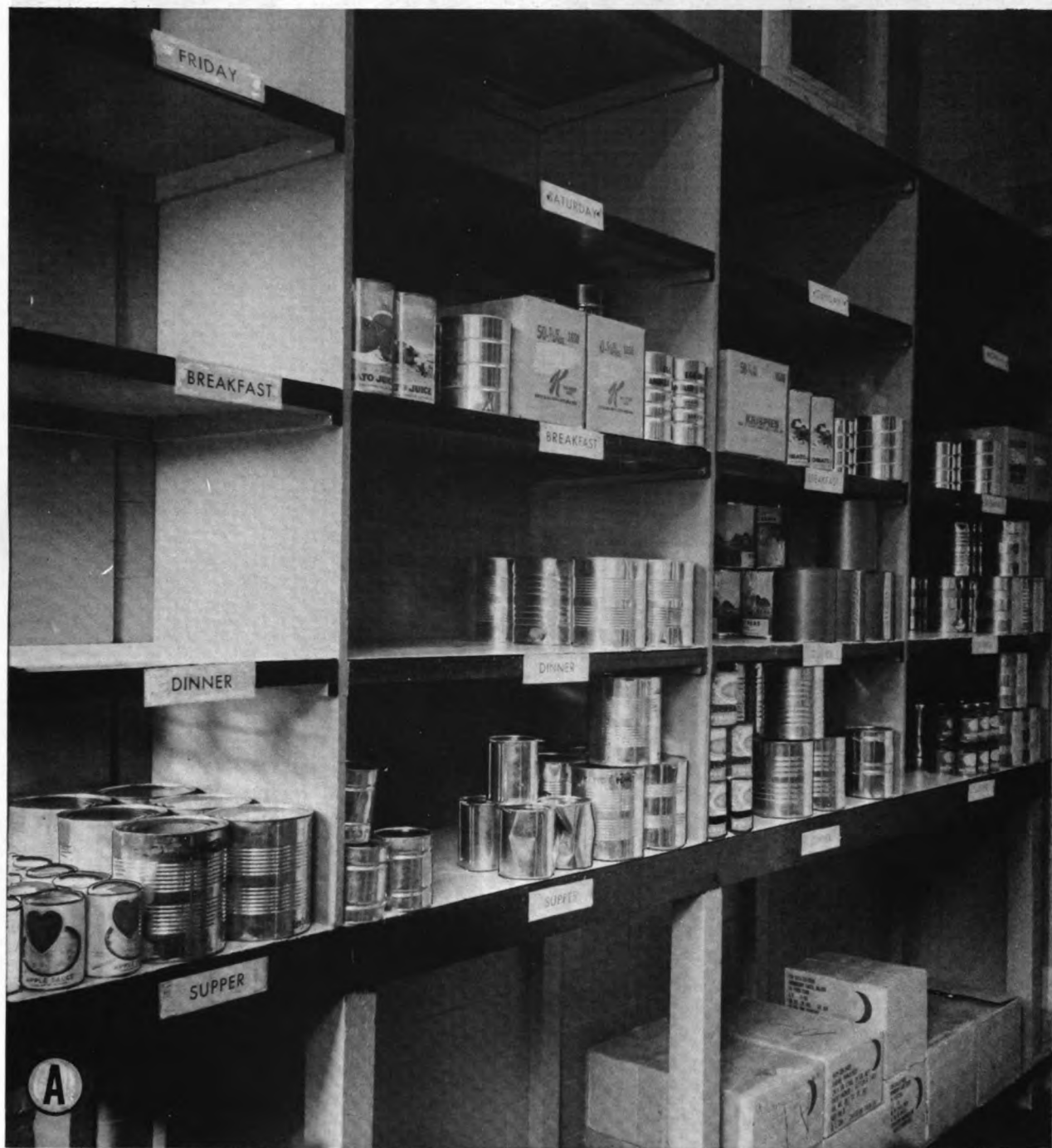
(1) *Shelving.*

- (a) When the weekly ration issue frequency is 2-2-3 and sufficient space is available, shelving should be divided into six vertical sections and three horizontal sections. This method of shelf division provides individual sections for a maximum of 3 days' issue at a single time plus one section for the remainder of the issue for the current day (A, fig. 3), one section for condiments, and one section for excess supplies (B). Canned and packaged goods should be stored neatly on the shelves. The labels should face out so that each variety of food can be easily identified when it is necessary to draw food from the shelves or when inventory is taken.
- (b) The counter-level shelf of the vertical shelving sections should be used for supper items; the shelf above it, for dinner items; and the shelf above that, for breakfast items (A, fig. 3). If the storeroom is small and space for installing shelves is limited, it may be necessary to store part of the issue on dunnage. The supplies should then be moved to shelving as soon as the use of the current issue already on the shelves permits.
- (c) Twenty-one signs, one for each day in the week, one each for condiments and excess supplies, and four for each of the three meals, should be made. Signs may be made of cardboard, wood, or sheet metal and should be provided with holes at the top so that the signs can be hung

on nails or hooks at the top of the shelving sections. The signs should be changed as necessary to identify the rations in the shelving sections correctly. Signs placed above the shelving sections for condiments

and excess supplies need not be changed.

- (d) Canned and packaged items should be stored on the shelving; items in cases or large bags should be stored on dunnage.



A. Sections for 3 days' issue and remainder of current issue

Figure 3. Shelves for storage of nonperishables subsistence.



B. Sections for condiments and excess supplies

Figure 3—Continued.

(2) *Dunnage.* The size of dunnage is controlled by the space available in the storeroom. When installations are not provided with facilities for fabricating dunnage at the request of an individual mess, it will be necessary for the mess steward to obtain scrap lumber for construction of the dunnage. The ideal dunnage is 2- by 4-inch runners topped with 2- by 10-inch planking; however, lumber of other sizes may be used to form whatever dunnage is necessary to insure that items stacked on the dunnage are high enough above the floor to be safe from contamination by floor dirt or moisture.

b. *Storage Inspection.* Nonperishables should be inspected at the time they are stored. The

mess steward or a member of the permanent mess staff should be present to inspect each item for visual defects; he should reject items that show outward signs of contamination. Rejected items should then be isolated from the acceptable stock and returned to the source of supply as soon as possible. Storage inspection should be accomplished as follows:

(1) *Dry stores.* Individual containers should be inspected for discoloration that may have resulted from exposure to grease or excessive moisture and for indications of damage caused by rodents. When containers are opened, the contents of each container should be inspected for signs of rodent damage or insect infestation. If evidence of such damage is discovered, the food

must not be used until the approval of the medical officer or veterinarian has been obtained.

- (2) *Canned goods.* Cans in which food is packed should be inspected for excessive rust and for leaks, holes, and swells at the ends. If any defect is found, defective cans must be returned to the source of supply.

35. Storage of Perishables

Perishables, when not stored under proper conditions of temperature, humidity, air circu-

lation, and sanitation, are subject to rapid deterioration. Each perishable item must be thoroughly inspected before it is stored (para. 33c(2)). If the perishable items are not used as scheduled, they should be culled as necessary.

a. *Refrigeration Equipment.*

- (1) All garrison messes are authorized one or more of each of the items of refrigeration equipment listed below. The number of persons served in the mess determines the number of items authorized and, in some cases, the size



Figure 4. Ice cream and frozen foods stored in frozen food cabinet.



Figure 5. *Perishable items properly stored in a 65-cubic foot reach-in refrigerator.*

or capacity of the item. Allowances are shown in TA 50-911.

- (a) Ice storage chest of 200-pound capacity, or ice-making machine.
- (b) Reach-in type frozen food cabinet, 8- to 12- or 18- to 22-cubic-foot capacity.
- (c) Reach-in refrigerator, 65-cubic-foot capacity.
- (2) Messes serving more than 200 persons are authorized an ice cream cabinet.
- (3) Messes serving more than 300 persons are authorized one or more walk-in refrigerators. Prefabricated walk-in refrigerators, in capacities ranging from 400 cubic feet to 1600 cubic feet, are authorized when built-in refrigerators are not provided.

b. Storage in Frozen Food Cabinet. Frozen foods should be segregated according to size and type and should be stacked so that all packages of each type are together. Items of

earlier issues should be moved to the top for ready use. Messes which are not authorized an ice cream cabinet must stack packages of frozen foods close together to allow room for storage of ice cream (fig. 4). The temperature maintained in the frozen food cabinet should be between 0° and minus 10° F.

c. Storage in Reach-In Refrigerator. Messes serving up to 100 persons are authorized one 65-cubic-foot reach-in refrigerator for the storage of perishables; messes serving between 101 and 400 persons are authorized two; and messes serving more than 400 persons are authorized one refrigerator per kitchen area and one per serving line. A temperature of between 32° and 45° F. should be maintained in the refrigerator. The refrigerator should be sanitized by careful cleaning; perishable items should be arranged for proper circulation of air, and odor-imparting and odor-absorbing foods should be separated (fig. 5).

d. Storage in Walk-In Refrigerator. A tem-

perature of between 32° and 45° F. should be maintained in walk-in refrigerators. Before fresh fruits and vegetables are stored, items delivered in crates should be removed from the

crates and inspected. The bad items should be discarded and the remainder stacked neatly on the shelves to allow for proper air circulation (fig. 6).



Figure 6. Fresh fruits and vegetables stored in walk-in refrigerator.

Section VIII. OPERATIONS AND PROCEDURES

36. Shifts and Shift Schedules

a. Basis for Shifts. Shifts must be established so that mess staff personnel will not have to work exceedingly long hours and will have a reasonable amount of time off. Shift schedules will be based on the number of mess staff per-

sonnel available for duty and the workload they must perform. Unit mess personnel should be divided into two groups so that they may work on a shift-on, shift-off basis. Consolidated mess staffs are larger, and their workload is subject to greater fluctuation; they may oper-

ate three shifts and overlap them during the period of the heaviest workload. This period usually occurs during the noon hour. Other situations that require the use of three shifts are when the mess is operated on a 24-hour basis and when it is necessary to serve a mid-night meal in addition to the three meals usually served during the day.

b. Personnel Requirements. Ordinarily, it is not possible to divide members of the mess staff into two or three groups so that all categories of personnel are represented equally. Each shift, however, should include sufficient personnel from each category if the mess is to be operated efficiently. Essential categories are as follows:

- (1) *Mess steward and assistant mess steward.* If a mess is small and is authorized only one mess steward, the first cook assumes the mess steward's duties when the mess steward is off duty. In larger messes, the mess steward and the assistant mess steward should be present for their respective shifts. When a midnight meal is served, either the mess steward or the assistant mess steward may be assigned the duty of supervising preparation of the meal. When sufficient personnel are available and qualified to perform the duties of assistant mess steward, as in many consolidated messes, assistant mess stewards may be assigned to each of the shifts. This procedure will relieve the mess steward of many of the details of his work and will enable him to devote his time to the overall operation of the mess. In such cases, the mess steward's hours are flexible and may be adjusted to the periods of greatest activity in the mess.
- (2) *First cooks.* The first cooks' responsibilities are determined by the number of persons to be fed and the number of cooks on each shift. There must be at least one first cook on each shift. When there is only one first cook on a shift, he must delegate some of his responsibilities to subordinates if he is to be free to exercise overall supervision of food

preparation. If two first cooks are on each shift, supervisory responsibilities may be divided into two groups: one for preparing, cooking, and serving meats, soups, sauces, and gravies and the other for preparing, cooking, and serving all vegetables, vegetable sauces, vegetable or fruit salads, and desserts.

- (3) *Cooks' helper.* Since the cooks' helper learns from on-the-job training, he should be detailed to duties directly under the supervision of the cooks. The helper should be on a shift that provides him with the opportunity to learn every detail of his work. Whenever possible, he should be given the same working hours and off-duty hours as other mess staff personnel.

37. Conferences

Conferences in the mess are key management functions. They should be limited to the daily meeting and such other special meetings as are absolutely necessary to keep mess personnel well informed on mess activities and planning.

a. Daily Meeting. The daily meeting is the most important management conference held in the mess. Discussion at this meeting should be limited to a review of the cooks' worksheets for the preceding and succeeding 24-hour periods, including a followup on instructions issued for the preceding 24-hour period; personnel and morale problems; long-range planning; and other problems of a recurring nature.

- (1) *When it should be held.* The ideal time for holding the daily meeting is just after the dinner meal, when the work of the outgoing shift has been completed and the work of the incoming shift is about to begin.
- (2) *How it should be conducted.*
 - (a) Schedule the meeting at an hour convenient to all concerned and start at the appointed time. If properly planned and conducted, the meeting should not last more than 30 minutes.
 - (b) Discuss all subjects in the order in which they should be brought to the attention of attending personnel.

- Have all materials such as cooks' worksheets, training manuals, or regulations assembled at the place at which the meeting will be held.
- (c) Make sure that all personnel understand each problem before proceeding to the next problem. See that each problem is clearly defined so that all will understand it.
 - (d) Ask each person at the meeting for his opinion on each of the matters discussed. The less aggressive persons at the meeting should be encouraged to make suggestions.
 - (e) Do not permit the conversation to stray from the subject.
 - (f) Summarize the group discussion and make sure that each of the persons present at the meeting has been informed of his responsibilities.
- (3) *Review of preceding 24-hour period.* Activities of the preceding 24-hour period should be reviewed. The mess steward should check to see that all routine duties have been performed and all special instructions followed, particularly the special instructions entered on the cooks' worksheet. Any failure to prepare, cook, or serve food properly should be brought to the attention of responsible personnel at this time; conversely, personnel performing their duties in an outstanding manner should be commended.
- (4) *Review of plans for succeeding 24-hour period.* The review of the succeeding 24-hour period must be thorough, and plans for the next three meals must be completed at this time. The cooks' worksheet should be discussed in detail, item by item; and any special instructions should be fully explained to the leaders of the incoming shifts. Any other anticipated problems should be discussed and plans made to take care of them. This phase of the daily meeting is of the utmost importance; proper planning will result in fewer mistakes being made, and shift leaders will know exactly what they are expected to do.
- (5) *Participating personnel.* Every effort should be made to include all of the mess staff personnel as often as possible. Personnel and morale problems will be appreciably reduced if personnel are encouraged to take an active part in the daily meetings. The mess steward should earnestly solicit suggestions for improvement of the mess operation and the development of better personal relations between members of the mess staff. Persons present at the daily meeting should be made to feel that the mess steward is working with them, that he is constructively interested in their problems, and that a concerted effort is needed if the mess is to operate efficiently.
- (6) *Long-range planning.* The daily meeting provides a series of opportunities for long-range planning. Some of the subjects that would require long-range planning are as follows:
- (a) Special meals and decorations for holidays.
 - (b) Inspections.
 - (c) Selection of suitable replacements for mess personnel going on leave, being discharged, or being reassigned from duty in the mess for any other reason.
 - (d) Preparation of the food for unit picnics or parties.
 - (e) Improvements in the physical appearance of the messhall.
 - (f) Equipment replacement.
 - (g) Preparation for periods during which the unit will be in the field.
- (7) *Miscellaneous discussions.* Miscellaneous discussions should be confined to sanitation, police of messhall area, maintenance of equipment, safety measures in the mess, and any other problems of a routine or recurring nature.
- b. *Special Meetings.* Examples of special meetings are the training meetings (para. 48c) and the monthly meeting at which the master menu for the coming month is discussed.

38. Timing of Meals

The hours for serving meals are adapted to the operations of the unit or organization by the commanding officer. Usually, the hours designated by the commanding officer follow a fixed schedule. If such is the case, timing of meal preparation will be relatively simple. However, it will frequently be necessary for the mess steward to serve meals at irregular hours to members of his unit who have been assigned special details. For example, he may be required to serve a midnight meal to persons who have not been present for the regularly scheduled supper or who will not be present for the regularly scheduled breakfast. A time must be set for feeding the mess personnel, and the unit commander must decide between early and late meals for feeding special details.

a. Early Meals. Unusual duty hours may occasionally justify an early meal, but the serving of early meals is not a good mess practice. The mess steward should make sure that only authorized persons are fed the early meal. If men other than those authorized are allowed to eat earlier than the regular hour, mess personnel will be serving constantly from the beginning of the early meal until the end of the regular meal. This lengthening of the meal hour shortens or eliminates entirely the period between meals that should be used for meetings and conferences and other essential mess functions. Early meals encourage early preparation so that the troops being fed at the regular meal time are often served overcooked food. The early meal should be served only when the unit special detail personnel cannot be fed at any other reasonable time.

b. Late Meals. The most satisfactory solution to the problem of feeding special details at odd hours is the late meal. Guard duty or other special duties may be scheduled so that the off-duty relief may eat at the regular meal and the on-duty relief may eat at a later time. Orderly, mail, and supply rooms may also arrange reliefs so that some men may eat at the regular hour and others may eat at the later meal. Men who are to go on duty soon after they have been fed should be allowed to go to the head of the serving line. Every effort should be made to make the late meal as attractive as the regular meal. If the late meal is fed to special details, the majority of the

men in the unit will receive the food immediately after it has been cooked, when its freshness and flavor are at their prime. Although those few who eat the late meal must eat food that has been prepared for some time, this arrangement is preferable to that of serving the heldover food to the entire unit. Since most men would rather eat at the established hour, when the food is at its best and when they will have the company of most of their friends, unit personnel are not likely to be present for the late meal unless required to do so by the nature of their duties. The mess steward can easily determine the number of men who will ordinarily be present for late meals. Tables in a quiet corner of the messhall, away from the cleaning and other work that follows every meal, should be set up for the men who will be present for the late meal; and the meal should be served as soon as the men arrive. Although meal hours for the unit are established by the commanding officer, the mess officer should advise the commanding officer of the many disadvantages of the early meal and encourage him to specify the late meal for the good of all concerned.

c. Meals for Mess Personnel. In a consolidated mess, a cook is usually present throughout the night and may begin preparation of breakfast for mess personnel in time to have it ready for them when they report for duty. In a unit mess, mess personnel may report early and prepare and eat breakfast before beginning preparation of the meal for unit personnel. However, at the other two meals, mess personnel should not eat until after the regular meal hour; the objections to early meals for special details (*a* above) also apply to early meals for mess personnel.

d. Midnight Meals. Usually, the midnight meal is served to persons who, because of unusual duty hours, have missed or are expected to miss breakfast or supper. However, the serving of midnight meals is not always an exception; some units work on a 24-hour basis and midnight meals are served on a continuing basis. When the serving of a midnight meal is anticipated, the mess steward must make a notation in the "Remarks" section of the ration request that a certain number of the breakfasts or suppers requested for a specific date are to be served as a midnight meal. A separate cooks'

worksheet (DA Form 3034 or DA Form 3034-2, whichever is appropriate must be prepared for the midnight meal, and the headcount record and cash meal payment sheet must be maintained as for other meals. The use of the night meal pass is discussed in paragraph 30e.

e. Sunday and Holiday Meal Serving Schedule. The installation menu board is authorized to adjust the master menu to facilitate the serving of Sunday and holiday meals during two extended serving periods rather than during three periods of regular length, see AR 30-41.

39. Serving

a. General. TM 10-419 contains instructions for setting up a serving line and information on methods of serving and related subjects.

b. Seating Control. Efficient control of seating will do much to make dining room traffic flow smoothly. Members of the mess staff or kitchen police should be assigned, on the basis of one for each serving line, the task of seating the persons who eat in the mess. The following seating arrangements are recommended.

(1) *Segregation of grades.* Separate sections should be set apart for officers and noncommissioned officers. Reservation signs should be placed on the tables in these sections to show that the tables are reserved. The segregated sections should be located as far away from the end of the serving line as possible.

(2) *Order of seating.* Early diners should be directed to the unsegregated tables that are most distant from the end of the serving line. Tables should be filled from that point, along one side of the dining room toward the serving line, until all seats on the one side are filled. This procedure should be repeated on the other side of the dining room until all seats in the dining room are occupied. Seats should then be refilled in the order that the diners finish their meal and leave the dining room.

c. Table Service. Table service consists of clearing, cleaning, and resetting the dining hall tables. This service must be performed in consolidated messes and, to a lesser degree, in unit

messes. Table service during the meal hour will vary with the type of mess and with the equipment and number of men available for assignment to this duty.

(1) *Consolidated mess.*

(a) *Clearing tables.* In the consolidated mess, table service consists of "bussing" (collecting individual trays, chinaware, paper, and silverware from tables) by kitchen police. Kitchen police assigned to this duty must begin bussing tables as soon as the diners begin to leave the messhall and must continue their work until all tables are clean and set for the next meal. In many consolidated messes, individual mess equipment must be washed and used again during the same meal. The kitchen police must work fast enough to keep the dishwashing area supplied with this equipment so that the serving line can maintain an adequate supply of bowls, cups, trays, etc., during the entire meal hour.

(b) *Cleaning and setting tables.* As soon as the tables have been cleared, they should be cleaned and set by kitchen police. One person, equipped with a shelf truck or other wheeled conveyance, can perform this duty for the entire consolidated mess. One shelf truck tray should be filled with hot clear water. Another shelf truck tray should be filled with place settings. The settings should be assembled and wrapped in paper napkins prior to the time of the meal. The individual assigned this duty should sponge off the cleared tables and place the required number of place settings on each table. He should empty the tray containing the water each time he has to return to the dishwashing area for additional place settings. The tray should then be washed, or replaced by a clean one, and filled with hot clear water.

(2) *Unit mess.* Because of space limitations in most unit messes, it is neces-

sary for all persons, except those who eat at tables reserved for officers and noncommissioned officers of the first three grades, to carry their trays and other messing equipment to a central location. If waste segregation is required by local policy, mess personnel will direct plate waste segregation accordingly. Corrugated cans will be provided for this purpose, one can for each of the classifications into which the plate waste must be separated.

40. Leftovers

a. Reducing Amount of Leftovers.

- (1) If food is properly prepared and served, there is less likelihood that there will be leftovers. The first cook should make sure that the cooks follow the recipes with regard to amounts of ingredients, mixing methods, and cooking times and temperatures. The mess steward should supervise the setting up of the serving line and make sure that foods are attractively arranged. Hot foods should be served hot; cold foods, cold. Servers should be taught the techniques of proper serving, see TM 10-419.
- (2) When excessive amounts of food are prepared, there will be leftovers. Following are ways in which the preparation of excessive amounts of food can be controlled to a large extent.
 - (a) Close liaison between the mess steward and the unit first sergeant should be established. The first sergeant can provide the mess steward with an accurate estimate of the number of persons expected to be present for the day's meals; and when the mess steward prepares the cooks' worksheet, he can adjust the amounts of food to be prepared accordingly.
 - (b) The mess steward can also reduce the amount of leftovers by noting the acceptability of the various items on the menu. The food preferences of the soldier usually reflect his racial and geographical origin; foods that are generally liked by

members of his race or by people from the same section of the country will usually meet with his acceptance. Constant reference to the file of cooks' worksheets will enable the mess steward to make a deletion or a reduction in the amounts to be issued or prepared when a particular food item has poor acceptability.

- (c) When the mess steward knows that a particular item has poor acceptability among the troops, he should so advise the food adviser. Once the food adviser is aware that an item is not acceptable to the troops, he may recommend the reduction of the issue factor and the inclusion of another item as an alternate choice; or he may recommend the substitution of another item which will satisfy nutritional requirements.

b. Use of Leftovers. The use of leftovers accomplishes two objectives: to satisfy the appetites of the troops and to reduce food waste. When an item of food is left over, the mess steward writes the amount left over in the appropriate column on the cooks' worksheet and indicates whether the food is to be used at a later meal or is to be discarded. He may also make an appropriate notation in the "Results" column on the cooks' worksheet, indicating why the food had poor acceptability. Certain foods, such as cream sauce, hash, foods mixed with salad dressing, and other items listed in AR 40-5, tend to promote bacterial growth and must not be held over from one meal to the next. Leftovers that are to be used should be stored properly; foods that are perishable must be refrigerated immediately upon removal from the serving line. Leftovers must be consumed at the next meal if possible and under no circumstances may they be kept for longer than 24 hours. Leftovers to be served are listed in red on the appropriate cooks' worksheet beneath the items called for in the master menu. No leftover should be served in its original form if it can be served in any other way. Leftovers must be seasoned properly; the amount and kind of seasoning already in the food must be kept in mind, and overseasoning and flavor clashes must be avoided. Overcooking must also

be avoided most leftovers require only brief cooking.

41. Plate Waste Control

Plate waste may be controlled by a preventive training program and by systematic inspection of plate waste following meals. Plate waste control during the meal hour is an important contribution to the food conservation program in the mess.

a. Preventive Training Program. A preventive training program will do much to prevent excessive plate waste where it starts—at the serving line. Such a program should be conducted in both unit and consolidated messes. Posters and other visual aids, reminding personnel to take from the serving line only as much food as they think they can eat, should be placed in conspicuous spots near the entrance to the serving line. Technical films dealing with food conservation should be shown to unit personnel whenever training schedules permit.

b. Inspection of Plate Waste. In unit messes where space and time limitations do not permit the bussing of tables and where individuals must carry their plates or trays to a central waste collection point, a member of the mess staff should inspect plates and trays for excessive waste. When it is noted that an item is being heavily discarded by the diners, the mess steward should make an immediate determination of the reason for the low acceptability of the item. If the item has been overseasoned, undercooked, or burned or scorched, the mess steward can determine the appropriate action to preclude recurrence. When an item which has been properly cooked is generally discarded, the mess steward should ask unit personnel why the item has low acceptability. If the method of preparation is the reason given, he can try other recipes until a more acceptable item is produced. If the item continues to have low acceptability, he can reduce the amount to be prepared and instruct serving line personnel to serve smaller portions accordingly. He can then recommend a menu change to the food adviser.

42. Cleaning Procedures

a. Kitchen.

(1) Dishes, silverware, and utensils. Hand

and mechanical dishwashing procedures are included in appendix B.

- (2) Equipment.* Food preparation tables and other work surfaces must be cleaned after each use. Wooden table surfaces should be scrubbed with a stiff brush which has been dipped in a detergent solution, rinsed with a minimum amount of clear hot water, and allowed to air-dry. Stainless steel surfaces, utensil racks, and other metal fixtures should be washed with a detergent solution or soapy water, rinsed thoroughly, and dried as much as possible with a clean rag so as to prevent water spots. Other items of equipment should be cleaned after each use as specified in TM 10-415.
- (3) Kitchen fans and range hoods.* Cooking areas need special attention because of the grease, smoke, and steam which cause dirt to accumulate on range tops, hoods, and exhaust fans. Kitchen fans should be wiped daily and cleaned thoroughly once a week. Because of the location of the hoods over ranges and deep-fat fryers, care must be taken by those doing the cleaning to avoid injury; cleaning must be done when ranges and deep-fat fryers are not in operation. A strong detergent solution will dissolve the accumulated grease, and a clear rinse will complete the job. Removable metal filters should be soaked for 1 hour in a sink filled with a strong detergent solution, then rinsed and replaced when the hood is clean. Heat from the ranges will dry the hoods and fans.
- (4) Walls and windows.* Walls and windows should be cleaned as often as is necessary. Walls may be wiped with mild detergent or soap solution; extra care should be taken around doorways and other areas where dirt is likely to collect. When window-cleaning solutions are not available, a solution made of hot water and vinegar (about a tablespoon of vinegar to a quart of water) may be used. Apply the cleaning solution with a clean cloth and dry

the window with a clean, lint-free cloth. Windows should be cleaned inside and out. If windows are washed in direct sunlight, the glass will streak.

b. Dining Room. The dining room must be kept clean and attractive at all times. The room should be dusted frequently, particularly around the window sills. The areas around the condiment tables, milk dispenser, and water cooler should be kept free of litter and spilled liquids.

- (1) *Tables and chairs.* Tables and chairs must be wiped clean with a damp cloth after each meal. The legs and supports should be wiped as carefully as the more visible surfaces.
- (2) *Serving line.* The serving line must be cleaned thoroughly after each meal and the equipment on the line cleaned in accordance with instructions in TM 10-415.

c. Floors. Kitchen and dining room floors should be cleaned after each meal, after the mechanical equipment, work surfaces, and furniture have been cleaned. Before floor cleaning operations start, dining room chairs should be stacked, seats down, on the tables. Clean all floors except finished wooden floors as follows:

- (1) Sweep floors to remove as much dirt as possible.
- (2) Prepare a detergent solution (wash water) in one of the sinks. Put rinse water in a bucket equipped with a wringer so that the mop can be wrung dry enough to do a satisfactory job.
- (3) Scrub the floor in sections; avoid wetting a larger area than can be cleaned effectively by available personnel. Put only enough detergent solution on the floor to wet the section to be scrubbed. Scrub the floor with brushes or brooms; work the bristles in all directions so that cracks and crevices are cleaned.
- (4) To prevent accidents caused by persons slipping on wet floors, dry one section thoroughly before wetting the next. Use a clean mop to take up the soapy water. Rinse the mop frequently in clear rinse water and wring the mop out as dry as possible. Change

the rinse water as soon as it becomes dirty.

- (5) Repeat procedures in (3) and (4) until the entire floor has been scrubbed and dried. Work in one direction so that there will be a minimum of walking on clean floor areas. Finish near an exit when possible.
- (6) Wash all brooms, brushes, and mops and hang brooms and mops, heads down, to dry. Wash and rinse all buckets and sinks used during the cleaning operation.

d. Garbage Cans, Racks, and Outside Areas.

(1) *Garbage cans.*

- (a) A sign should be placed above each garbage can to indicate the type of refuse the can contains (for example, edible or inedible garbage, metal objects, or trash). The manner in which garbage and other refuse is segregated is specified in local garbage disposal procedures.
- (b) Garbage cans must be covered with snug-fitting lids. Care must be taken to avoid spilling garbage down the sides of the cans. Cans must not be banged together or thrown from the garbage trucks to the ground.
- (c) Garbage cans must be washed each time they are emptied. The cans should be washed inside and out with hot soapy water, scrubbed with a stiff brush, and rinsed with clear hot water. When cans have refuse sticking to them, the cans may have to be soaked before they are washed. A steam jet or a jet of hot water is a desirable final cleaning measure. Under no circumstances may these containers be painted or white-washed.

- (2) *Garbage can racks.* Garbage can racks should be washed with hot soapy water and rinsed with hot clear water. Garbage spilled from cans onto the racks must be cleaned up and the area rinsed and swept with a stiff broom if necessary. When the rack is not made of concrete, sand or gravel should be placed on the ground and raked to maintain a clean and neat appearance.

(3) *Outside area.* The area around the messhall, particularly the rear area, should be policed frequently for trash and should be kept neat at all times. The garbage collection area, if it is not properly maintained, can easily become a source of offensive odors and a breeding place for flies.

and in good taste (fig. 7); elaborate decorations can become as monotonous as bare walls. The purchase of decorative items for the mess from unit funds is authorized, but many items can be procured with little or no expense. Following are some of the things that can be done to improve the atmosphere of the mess area.

a. Interior Painting. The most important



Figure 7. Modern unit mess dining room.

43. Improvement of Dining Room Appearance

The atmosphere in which a meal is served, whether in a commercial restaurant or a military mess, has a definite influence on the attitude of the diner. Because a pleasant and attractive atmosphere creates relaxation, it aids digestion. If the military mess is to have the proper atmosphere, it must be decorated simply

step toward creating the proper atmosphere in the dining room is interior painting. Colors must be chosen for practicability. The ceiling and upper walls should be of a light color; white, cream, or yellow will provide maximum reflection of light and resultant brightness. Lower walls, from the floor to a point approximately 5 feet above the floor, should be of a contrasting color. Green or blue should be used

for this section of the walls, as these colors are restful to the eyes and show dirt less readily than the lighter colors.

b. Indirect Lighting. Most military messes are lighted by overhead fixtures that produce a direct glare. This glare may be softened by the use of indirect lighting. In the absence of indirect lighting, shades will greatly reduce the glare of dining room lights.

c. Shades and Blinds. The dining room should be bright and sunny, but direct sunlight should not shine in the eyes of persons who may be sitting near windows. Venetian blinds, which reflect light into the room while intercepting the direct rays of the sun, are the most desirable means for reducing sunglare without interfering with ventilation.

d. Window Draperies. Window draperies do much to dress up the dining room. If it is not possible to procure suitable material for draperies on the installation, investment of unit funds in such material will provide the dining room with added cheerfulness. Making simple draperies requires little time and skill.

e. Tables and Table Coverings. Tablecloths add immeasurably to the appearance of the tables and of the dining room as a whole. The daily use of line tablecloths is rarely practicable in military messes because the initial cost of supplying linen tablecloths is high; also, the cloths become soiled easily, and the cost of laundering is often prohibitive. The use of plastic tablecloths, however, will improve the appearance of the dining room at less initial cost; and these cloths do not require laundering. Plastic tablecloths may be purchased from unit funds. Messes should have special table coverings for use on Christmas or Thanksgiving, or for other special occasions such as organization parties. Impregnated paper coverings with designs appropriate to the occasion may also be purchased with unit funds, provided the

approval of the installation fire department is first obtained.

f. Table Decorations. Simple decorations on the dining room tables add a homelike touch to the mess. If the mess is of a permanent nature, flower gardens or borders along the sides of the dining hall will improve exterior appearance and also provide flowers for table decorations.

g. Pictures. The use of pictures will add warmth to bare wall space. Prints of famous paintings, suitable for framing, may be obtained from sources such as popular magazines, commercial calendars, or Special Services. The prints may be mounted with little difficulty and framed by installation carpentry shops or nearby commercial concerns. Views of places of interest in nearby towns may be procured from local civic organizations. Enlargements of installation scenes may be obtained from the installation photographic laboratory. Food service posters, if not supplied to the mess through usual distribution channels, may be obtained from the food adviser.

h. Holiday Decorations. The spirit of any holiday is best expressed by appropriate decorations. Decorations should not be elaborate or expensive but should be suited to the occasion and unusual enough to give special significance to the holiday. Resourceful mess personnel can get attractive decorations at little or no cost. Bowls of fruit and autumn leaves capture the spirit of Thanksgiving; streamers of green and red paper for Christmas are inexpensive and may be saved from year to year. These may be supplemented with evergreen boughs and a Christmas tree. Decorations for the tree may be improvised and stored for future use. For other holidays, any appropriate touch, such as heart-shaped cookies for Valentine's Day and cherry pie for Washington's Birthday, will break the routine of three meals a day and add interest and variety to the ordinary food.

Section IX. MESS INSPECTIONS

44. Purpose

The purpose of mess inspections is to insure the maintenance of high standards of mess operations. The commanding officer, the mess officer, and the mess steward are required to

make frequent mess inspections, as outlined in section IV.

45. Inspection Checklist

Following is a sample mess inspection checklist. Checklists will vary from installation to

installation but should include, as a minimum, the items listed below.

MESS INSPECTION CHECKLIST

1. PERSONNEL

- a. Hair neatly trimmed and free of greasy hair dressing.
- b. Face cleanly shaven.
- c. Head covered by a clean white cap or hair net.
- d. White clothing clean and neat.
- e. Hands clean and free of cuts and sores.
- f. Fingernails short and free of dirt.
- g. No rings except plain wedding band.
- h. Food handler certificates posted in conspicuous place.
- i. Certificates of personnel who have been absent from food-handling duties for more than 30 days dated subsequent to return to duty.

2. BUILDINGS

a. Floors

- (1) Clean and in good condition.
- (2) Signs that water has been splashed on lower part of walls. (If such signs are found, kitchen police should be reminded that less water should be used for washing floors.)
- (3) Floors in need of refinishing. (If floors need refinishing, mess steward should make a note to have refinishing done as soon as time and materials are available.)

b. *Screens.* Clean, well fitting, and in good repair.

c. Doors.

- (1) Sufficient number to provide easy exit for personnel in case of fire.
- (2) Doors swing outward.
- (3) Satisfactory lock for each door. (Locks should be tested to see that they are in good working order.)
- (4) No broken or missing door panes. (If panes are broken or missing, mess steward should request replacement as soon as possible.)

d. Windows.

- (1) Clean.
- (2) No missing or broken panes.
- (3) Equipped with adequate and workable locks.

e. Storerooms.

- (1) Adequate storage space for subsistence supplies.

(2) Enough shelf space to accommodate those items which should be stored on shelves.

(3) Enough dunnage to provide for storage of case goods and other goods which have not been broken down for consumption.

(4) Subsistence stored in such a manner that the items (except bread) can be used on a first-in, first-out basis.

Note. The freshest bread on hand should be for table use; the less fresh bread can be used for toast, french toast, croutons, bread puddings, dressings, etc.

(5) Storeroom clean, well ventilated, and sanitary.

(6) Insect and rodent control measures being followed.

3. EQUIPMENT

a. *Engineer maintenance charts.* Charts attached to or posted near each item of mechanical equipment.

b. Ranges.

- (1) Free of rust, dust, excessive grease, and accumulations of carbon from food or spillage burned on the surfaces of the ranges.
- (2) Oven level enough to permit satisfactory baking.
- (3) Door handles tight and doors in good condition to provide good closure all around.
- (4) Thermostats checked recently for proper calibration.

c. Refrigerators.

- (1) Clean and free of odors.
- (2) Adequate space for storage of perishables.
- (3) Operating at prescribed temperatures.
- (4) Odor-imparting or odor-absorbing foods segregated, wrapped, or placed in tightly covered containers.
- (5) Foods stored to provide for satisfactory circulation of air in the refrigerator.
- (6) Door gaskets form a tight seal when doors are closed.

d. Dishwashing facilities.

- (1) Water at the temperature prescribed in AR 40-5.
- (2) Detergents and soaps properly and economically used.
- (3) Sinks free of grease.

- (4) Drains in dishwashing area permit unrestricted flow of liquid wastes and wash water.
- (5) Dishwashing machines in good operating condition, with all thermostats working properly.
- (6) Exposed parts of dishwashing machines free of excessive accumulations of mineral scale deposits.
- (7) Accumulated grease removed from grease traps within past 24 hours.

(Note. AR 420-55 prescribes that food handlers (cooks, mess stewards, servers, etc.) will not clean grease traps. Other company personnel, who are periodically trained by the installation engineer, clean the inside or outside grease traps serving unit messhalls. Engineer personnel clean the outside grease traps serving consolidated messhalls.)

e. Mixing machines.

- (1) Free of rust, grease, and food particles.
- (2) Attachments on hand and properly cleaned and stored.

f. Vegetable peeling machines.

- (1) Clean and free of odor.
- (2) Surface of abrasive disk rough.
- (3) Disk in good condition.
- (4) Water supply and drainage systems functioning properly.

g. Deep-fat fryers.

- (1) Deep-fat fryers clean and free of odor and excess grease.
- (2) Fry baskets clean, of the proper size, and in good condition.
- (3) No fat stored in deep-fat fryer.

h. Toasters.

- (1) Clean and free of breadcrumbs.
- (2) Heating elements and conveyor belts in good operating condition.

i. Steamtables.

- (1) Free of rust and sediment.
- (2) Plentiful water supply; water at correct temperature.
- (3) All steamtable inserts and insert covers on hand and in good condition.

j. Steam cookers and steam-jacketed kettles.

- (1) Clean and free of food particles inside and out.
- (2) Drains functioning properly.
- (3) All safety devices in good operating condition.
- (4) Floor drainage adequate (no pools of water on floor).

k. Meat-slicing machines.

- (1) Free of rust and grease.
- (2) All exterior surfaces clean.
- (3) Cutting blade sharp and free of nicks.
- (4) Safety devices installed and in good operating condition.

l. Baking and roasting ovens.

- (1) Clean and free of rust.
- (2) In good operating condition.

m. Small utensils, pots, and pans.

- (1) Authorized numbers and types on hand.
- (2) Clean and properly stored.
- (3) Knife handles and other wooden handles free of cracks, tight on rivets, and properly cleaned.

n. Food preparation tables.

- (1) Not cracked or split.
- (2) Clean and free of odors.
- (3) Cutting boards being used for cutting, slicing, and chopping, so that table tops will not become marred.
- (4) Items stored in table drawers arranged neatly and systematically.

o. Dining tables.

- (1) Clean.
- (2) No chewing gum on bottoms of tables.
- (3) Legs secure and sturdy enough to hold table steady.
- (4) Benches, stools, or chairs clean, sturdy, and in good condition.

p. Plasticware and glass dinnerware.

- (1) Free of cracks, chips, and stains.
- (2) Authorized allowances either on hand or on requisition; no excesses.
- (3) Clean.
- (4) Storage facilities adequate and of approved type.

q. Mess trays and silverware.

- (1) Clean and serviceable.
- (2) Authorized allowances on hand; no excesses.

r. Condiment containers.

- (1) Clean.
- (2) Cap holes not clogged.

4. MESS RECORDS AND ADMINISTRATION

a. DA Form 2970 (Subsistence Report and Field Ration Request), DA Form 3034-series (Cooks' Worksheet), DA Form 3033 (Headcount Record), DA Form 3032 (Mess Guest Register), and Cash Meal Payment Sheets and Cash Meal Payment Sheet Record from DD

Form 1544 maintained in accordance with current directives.

b. Record of meal status accurate and up to date.

c. Filed copies of DA Form 3122 or 3161, when on hand (see para. 28), indicate that excess rations have been turned in, in accordance with turn-in schedule established by local commissary.

d. Filed copies of DA Form 3122 or 3161 or of DD Form 1131 indicate that cash collected from sale of meals has been turned in as prescribed by AR 30-41.

e. Headcount properly performed.

f. Unauthorized persons not being fed.

g. All required SOP's on hand.

h. No accumulation of excess food items.

5. CLOTHING

All white clothing on hand in unit supply facilities, being laundered, or on requisition.

6. CLEANING MATERIALS

a. Being used economically.

b. Adequate supply on hand.

c. Supplies properly stored.

7. FOOD PREPARATION

a. Trimming of meats and vegetables done with as little waste as possible.

b. Fresh fruits and vegetables properly sorted and cleaned as required.

c. Recipes in TM 10-412-series or in master menu notes being followed with regard to quantities, mixing methods, and cooking times and temperatures.

d. Timeliness of preparation.

8. SERVING

a. Hot foods served hot; cold foods, cold.

b. Food on serving line properly arranged and garnished.

c. Servers courteous; follow proper serving methods as outlined in TM 10-419.

d. Food removed from serving line as soon as last man has passed through line.

e. Suitable leftovers refrigerated immediately and used within 24 hours.

9. OUTSIDE AREA

a. Area around messhall properly policed.

b. Garbage racks clean and orderly.

c. Cans labeled as required.

d. Boxes, egg crates, tin cans, burlap, paper, and glass arranged according to installation salvage policies.

e. Garbage segregated as required by local directives.

Section X. TRAINING OF PERSONNEL

46. General

Training and practical experience in all phases of mess operations will improve the efficiency and broaden the individual capabilities of all mess personnel. When at least two persons can perform every task in the mess, the loss of a key member of the mess staff will not cause a period of confusion and a lowering of standards.

47. School Training

Food service schools are available for training mess personnel, and attendance at these schools should be encouraged at all levels of responsibility. Mess stewards have the responsibility of cooperating with food advisers and of advising unit commanders on the assignment of eligible mess personnel to food service schools.

48. On-the-Job Training

a. On-the-job training is given during working hours by the mess steward and other members of the mess staff. Throughout the training period, personnel to whom trainees have been assigned should exercise close supervision over the activities of the trainees and should be aware of the trainees' need for detailed instruction.

b. The mess steward should prepare a simple training schedule that covers the necessary training, step by step, for each of the specific jobs in the mess. Although the schedule should be flexible enough to allow for differences in the achievement capabilities of individuals, it should be followed as closely as possible throughout the training period. A trainee should not be advanced to the next step until

his supervisor is satisfied that he thoroughly understands his present assignment and can demonstrate his understanding through the quality of his work. Satisfactory completion of each step should be noted.

c. Frequent meetings, in which participation is limited to those actually assigned to the supervision of on-the-job training, should be conducted. Any training problems encountered

by the supervisors should be freely discussed and resolved at these meetings, and any suggestions to improve methods of instruction should be encouraged.

d. Demonstrations by local personnel or by food service teams can be used to teach almost any phase of food service operations. The mess steward can request the food adviser's assistance in arranging for demonstrations.

CHAPTER 3

FIELD MESSING

Section I. GENERAL

49. Field Messes

The two types of field messes are the rear area (semipermanent) type and the forward area (temporary) type. The forward area field mess consists of a mobile kitchen or a forward area mess tent. Any type of canvas or tarpaulin that is available to the unit may be used as a cover. Each type of field mess operates with equipment authorized by its unit TOE and, if combat conditions permit, with field expedients built from available materials.

a. Facilities. The chief differences between the field mess and the garrison mess are in the types of equipment available for use, the conditions under which the equipment must be operated, and the manner in which the troops are fed. Buildings are rarely available for field messing, and equipment is limited; meals must be prepared and served in the open in all kinds of weather. The area available for setting up a field mess frequently has many undesirable features, and the storage and sanitation facilities characteristic of the garrison mess are makeshift at best in the field mess and may be lacking entirely.

b. Training. Mess personnel must be taught the techniques of messing in the field. The mess steward should constantly strive to make

the field mess as much like the garrison mess as possible. When troops are training under simulated combat conditions, as is often the case when field exercises are conducted in the continental United States or in oversea staging areas, field messes should be operated as they would be under actual combat conditions.

c. Sanitation. The importance of observing proper sanitation procedures in field messing cannot be overemphasized. FM 21-10 contains information on field mess sanitation.

50. Menus

Each theater of operations either publishes a master menu or uses the CONUS menu. The menu must be used as a guide for the proper use of field and operational rations. Items listed on the menu are subject to change in accordance with local conditions of procurement and supply. If the unit is subsisting on the "B" ration, the menus in SB 10-495 must be used. If the unit is subsisting on packaged rations, the menu furnished with the rations must be used.

51. Request for and Delivery of Rations

Rations are requested and delivered in accordance with AR 30-46, FM 29-3, and FM 54-2.

Section II. REAR AREA MESSING

52. General

The rear area mess should be located as close as possible to the combat area, but far enough to the rear to be relatively safe from ground attack. Although the site of the rear area mess will move as the lines of battle change, it may remain in the same location for months. Be-

cause of the semipermanent nature of the rear area mess, there is time for improvement of facilities; and personnel can be fed with less difficulty than in the forward area. When two or more units are fighting in the same vicinity, it is often advisable to combine their messes so that all may take advantage of the water

supply, terrain, opportunity for concealment, and other desirable features of the best mess site available.

53. Site Selection

The site of the rear area mess is usually determined by the unit commander and is based on the tactical commitments of the unit. In the absence of the unit commander, it may be necessary for the mess steward to select the site. The site selected should incorporate as many of the following features as possible:

- a. Have good natural cover in a wooded section. The site should be well shielded from enemy observation.
- b. Have sufficient access roads to provide free movement of mess vehicles.
- c. Be located on high, dry ground and near a slope that provides good drainage.

d. Be located as near to the troops to be fed as combat conditions will permit.

e. Be located near a natural water supply, such as a lake, stream, or spring.

54. Rear Area Mess Layout

A typical layout for a rear area mess is shown in figure 8. This layout assures a smooth flow of traffic through the serving line and messkit laundry line, permits easy exit from the area if it is necessary for the troops to withdraw hurriedly, and includes storage and waste disposal facilities. If a latrine is located in the area, it must be at least 100 yards downhill from the kitchen tent.

55. Equipment and Facilities

a. *Kitchen Tents.* Either the M1948 kitchen tent (fig. 9) or the general-purpose tent (fig.

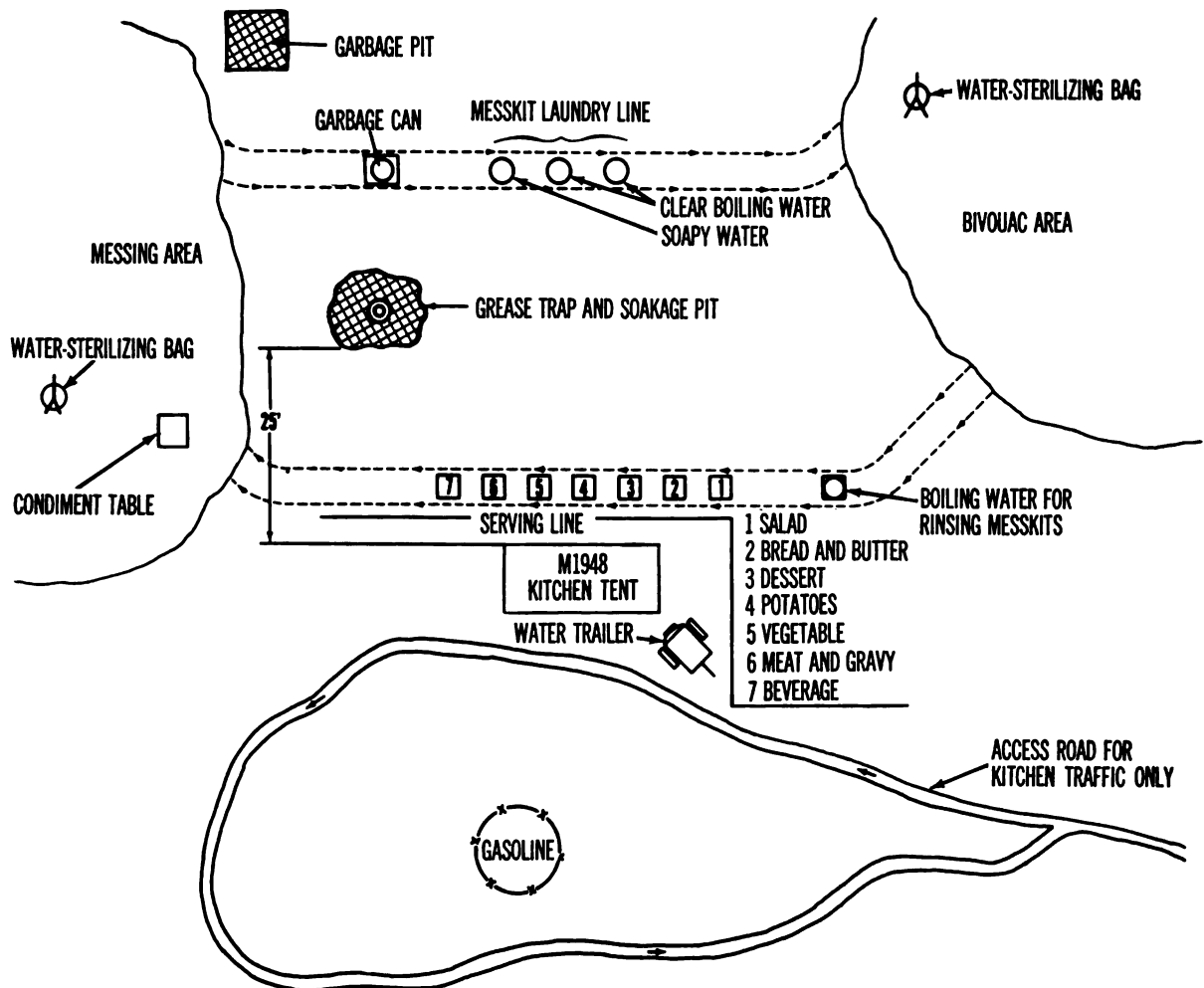
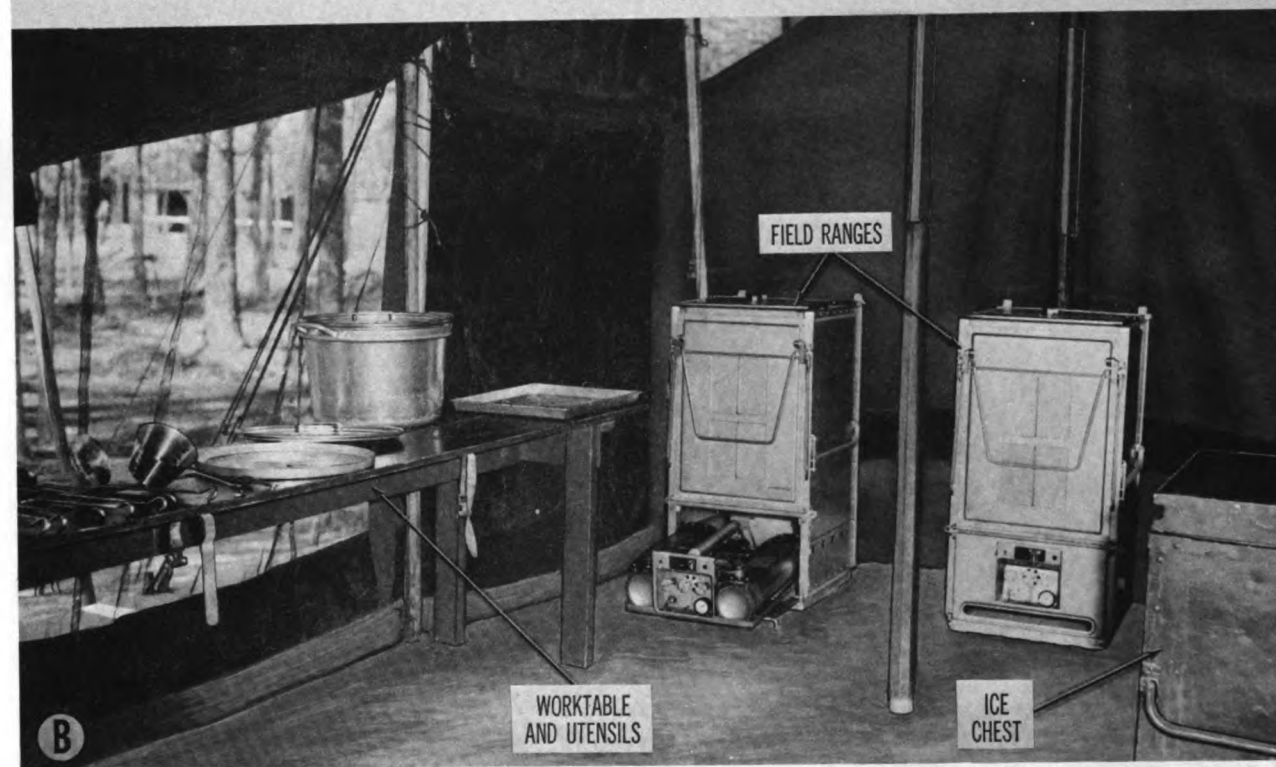


Figure 8. Rear area mess layout.

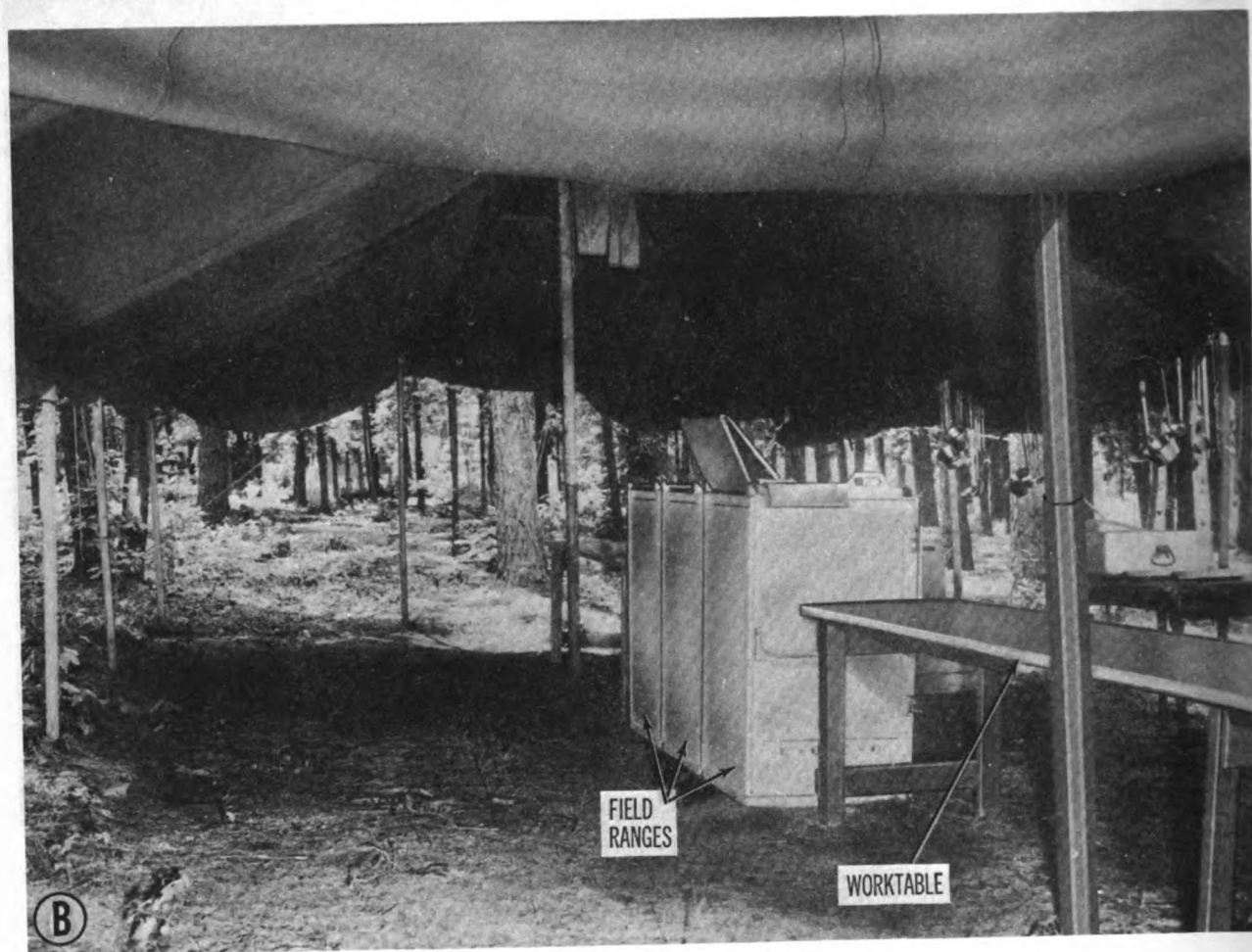


A.—Exterior view
B.—Interior view

Figure 9. M1948 kitchen tent.

10) may be used. Instructions for erecting these tents are contained in FM 20-15. The tent should be located on level ground and should

have as much natural camouflage as possible. If material is available, a floor should be laid in the tent.



A.—Exterior view
B.—Interior view

Figure 10. General-purpose tent.

b. Storage Facilities. When the rear area mess is to stay in one place for several days or longer and mechanical refrigeration is not available, storage facilities must be provided. The underground food box (fig. 11) is satisfactory for storing perishables for a short period of time. The insulating and cooling qualities of the moist earth beneath the ground surface protect stored food from the elements. The natural refrigeration provided by subsurface storage can be supplemented by thawing frozen meats within the storage space. Frozen meats will help to refrigerate other perishables during the period required for the frozen meats to thaw. Garrison mess storage procedures should be followed as closely as possible. A large packing box and a slightly smaller one are required for constructing an underground food box. Construct food box as follows:

- (1) Cut holes in bottom of larger box and cover outside walls of box with waterproof paper or a similar material.
- (2) Using hinges, convert the top of the box into a door.
- (3) Dig a hole slightly larger than the large box and fill the bottom of the hole with a level layer of loose rocks or gravel.

- (4) Lower the larger box into the hole. The top of the box should be even with the ground or slightly below ground level.
- (5) Place the smaller packing box in the larger box. The outer walls of the smaller box should be 3 to 4 inches away from the inner walls of the larger box.
- (6) Fill the space between the boxes with straw, grass, or sawdust. The filler material should be kept damp at all times for best results.
- (7) If ice is available, partition off one end of the box to form an ice compartment.

c. Water-Sterilizing Bags. Water-sterilizing bags are used to sterilize and dispense drinking water. Approved methods of sterilizing water are given in FM 21-10. Water-sterilizing bags should be installed so that they have adequate drainage and overhead protection. A small sump pit will prevent puddling of water beneath the bag. The bag may be suspended from the branch of a tree or a pole mounted horizontally (fig. 12), or it may be supported by poles tied at the top to form a tripod (fig. 13).

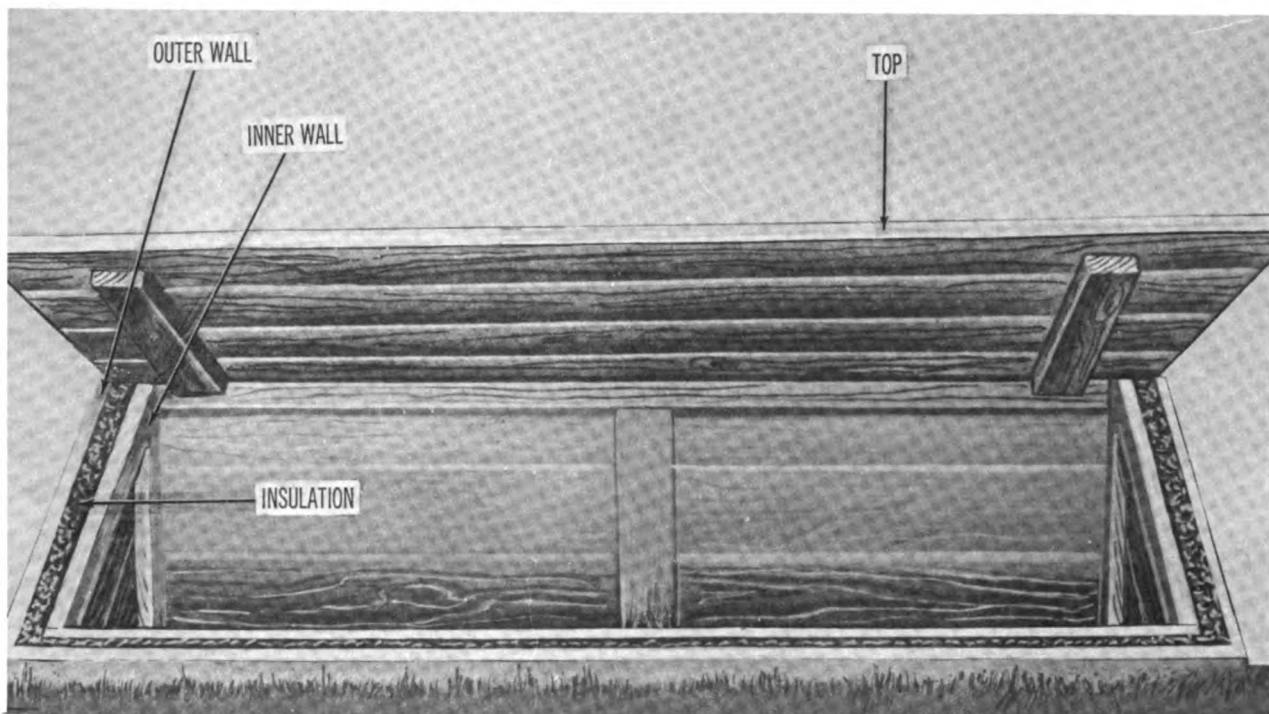


Figure 11. Underground food box.



Figure 12. Water-sterilizing bag suspended from pole.

56. Food Preparation, Cooking, and Serving

Garrison mess procedures should be used as a guide for preparing, cooking and serving food. To facilitate timely preparation of meals, cooking methods that allow part of the food to be cooked on top of the field range and part of it to be cooked in the oven should be used whenever possible. Every effort should be made to see that food is served in the most appetizing manner possible. The food conservation measures used in the garrison mess should be emphasized.

57. Sanitation

The proper disposal of garbage is absolutely

necessary if the health and welfare of the troops is to be protected. The field expedients used for garbage disposal are a grease trap and soakage pit and an incinerator. The grease trap and soakage pit (*a* or *b* below) is used to separate solids from liquid waste. The solids recovered from the grease trap and the solid waste resulting from kitchen operations are burned in the incinerator (*c* or *d* below). Soakage pits should be located on a slope to allow drainage but should never be at a point higher than the kitchen. If it is necessary to bury garbage in the field, the disposal pit should be dug at least 75 to 100 feet from the kitchen tent.



Figure 13. Water-sterilizing bag supported by tripod.

a. *Grease Trap and Soakage Pit.* A grease trap and soakage pit should be constructed if the required materials are available. Lists of materials and construction details are shown in figure 14. The top of the grease trap should be lifted and the grease skimmed from the liquid waste daily.

persons. If the feeding area is to remain in the same place for two weeks or more, two pits should be constructed for every 200 persons to be fed. When two pits are available, the pits may be used on alternate days so that each pit is given a chance to dry out every other day.

c. *Inclined Incinerator.* One inclined incin-

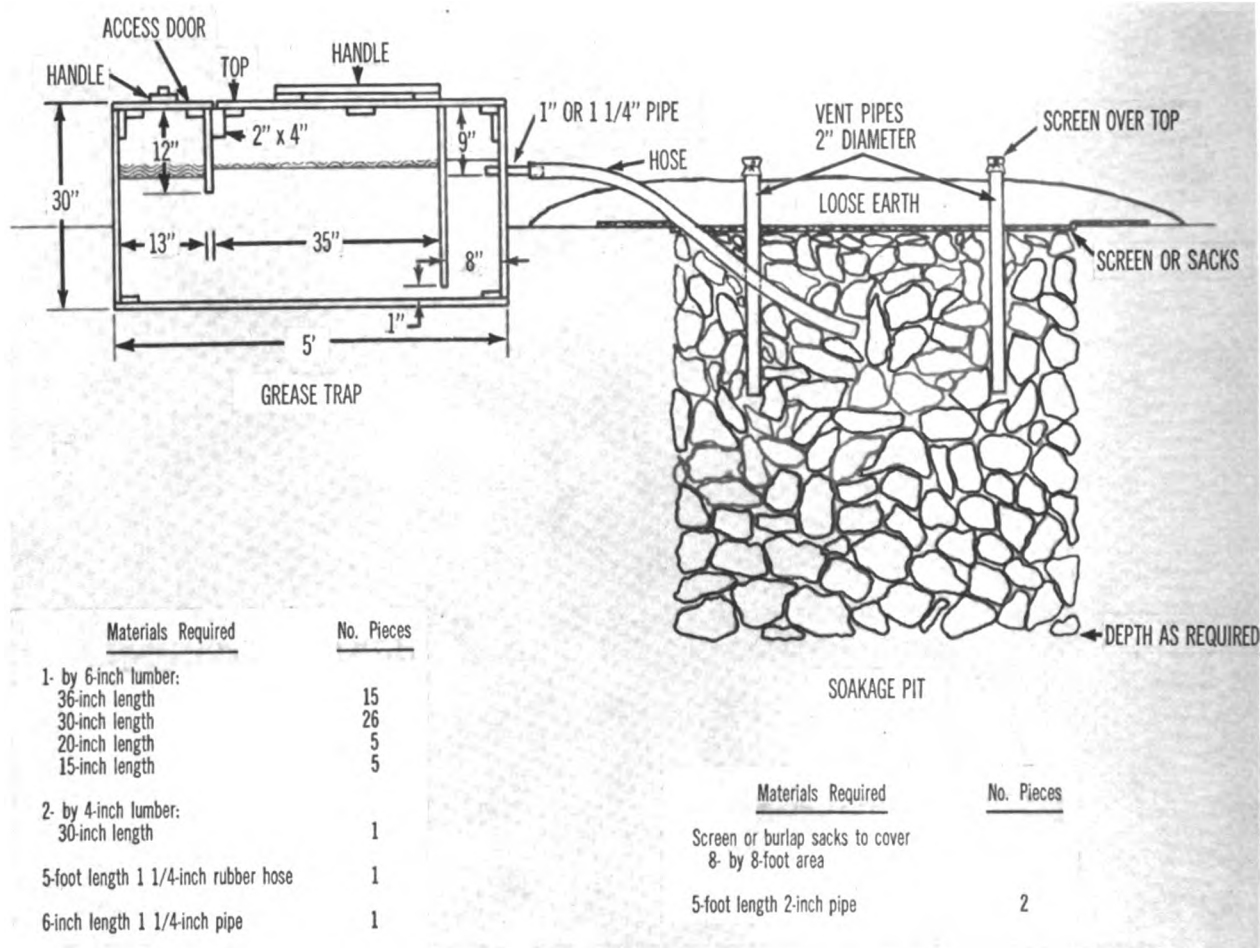


Figure 14. Grease trap and soakage pit, construction details.

b. *Combination Grease trap and Soakage Pit.* Construction of the combination grease trap and soakage pit (fig. 15) requires a minimum of materials and time. Materials needed for the construction of this field expedient are a pail or bucket, with holes punched in the bottom; a drum or other metal container, with holes punched in the bottom; sacks or matting; two pipes or wooden ventilating shafts; and straw, sand, gravel, and broken stones or bricks. Each pit will take care of the kitchen waste from 200

erators (fig. 16) is sufficient for burning the garbage from a 500-person feeding area. The materials needed for construction of this incinerator are three oil drums with ends removed, stones, and a waste receptacle.

(1) *Construction.*

- Dig a fire pit at the lower end of a hill or ditch bank. Line the edges of the pit with rocks to confine the blaze.
- Dig a shallow trench, about 6 inches

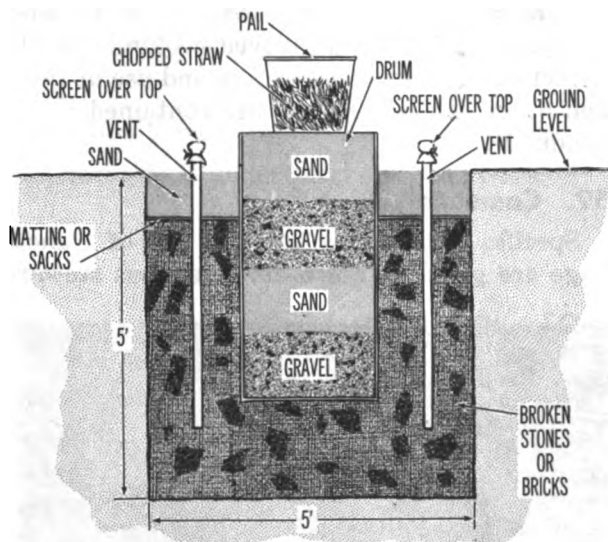


Figure 15. Combination grease trap and soakage pit, construction details.

deep, from the fire pit up the bank. The trench should be long enough to accommodate three oil drums laid end to end.

- (c) Install the drums in the trench; crimp the lower end of each of the two top drums so that each drum will fit tightly into the drum beneath it. The lowest drum should extend over the pit far enough for the fire pit flame to be drawn up the incline.
- (d) Place waste receptacle on level ground above the incinerator so that waste can be transferred easily from receptacle to incinerator.

(2) Operation.

- (a) Build a fire of wood or rubbish in the fire pit.
- (b) Drain garbage in grease trap. Push some of the drained garbage down into the drums. The garbage will slip down to the fire pit as additional garbage is added from the top.
- (c) Remove residue from the fire pit as necessary. Reburn any partially burned garbage.
- (d) Bury residue with at least 2 feet of cover.

d. *Cross-Trench Incinerator.* Two cross-trench incinerators (fig. 17) are required for

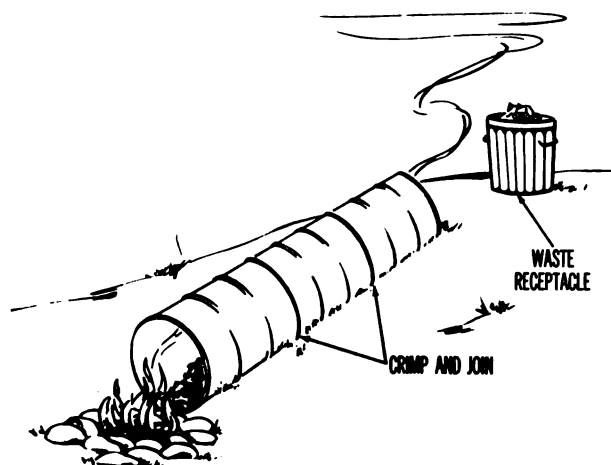


Figure 16. Inclined incinerator.

burning the garbage from a 500-person feeding area. Materials required are one oil drum with both ends removed; pipes, bars, or a heavy steel screen; and concrete blocks, bricks, or stones, if available.

(1) Construction.

- (a) Dig two trenches, each 1 foot wide and 10 feet long, with centers of the trenches crossing at right angles. The trenches should slope from ground level at the outside edges to a depth of 18 inches at the center.
- (b) Use concrete blocks, bricks, or stones, if available, for corner supports at the four points of intersection.
- (c) Position grate and drum as shown in figure 17. If pipes or bars are used for the grate, they should be spaced not more than 3 inches apart.

(2) Operation.

- (a) Drain garbage in grease trap. If possible, mix the garbage with dry combustible materials or tin cans before emptying it into the drum. The added materials will create air-spaces within the garbage and cause it to burn more readily.
- (b) Start a fire on top of the grate and empty a small amount of garbage into the drum. If the fire is in danger of going out, build another fire beneath the grate. Close off all trenches except the one that faces

the direction from which the wind is blowing.

- (c) Add garbage to the fire; be careful not to smother the fire by adding too much garbage at one time. Loosen garbage periodically with a stick.
- (d) Bury residue. Be sure that sufficient cover has been provided.

may be converted into expedients that will take the place of lost or destroyed cooking vessels. Directions for the construction and use of these and other field expedients are contained in appendix D.

59. Camouflage

Specific instructions for the use of camouflage are given in FM 5-20. The mess steward

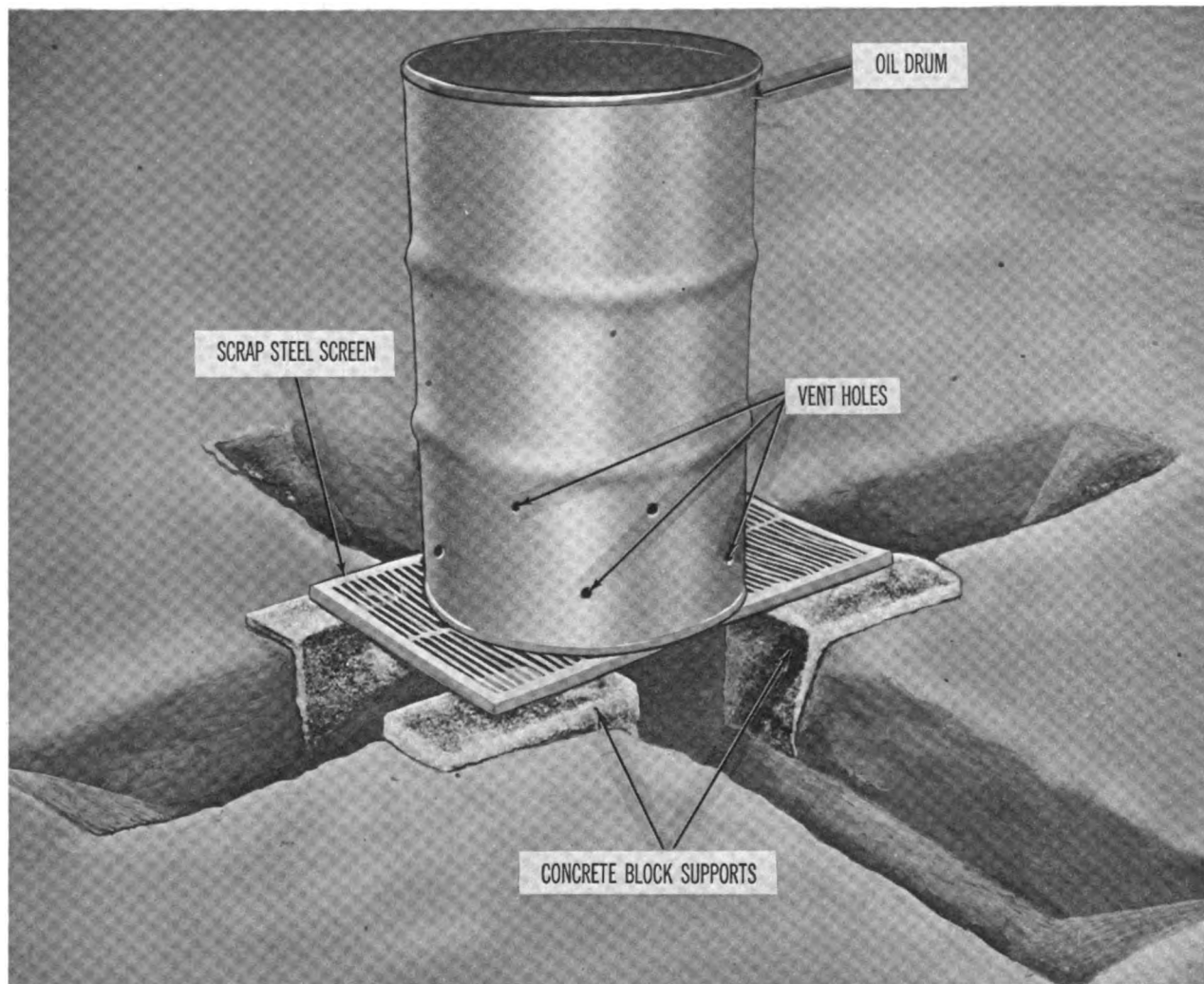


Figure 17. Cross-trench incinerator.

58. Miscellaneous Field Expedients

Lost or destroyed field mess equipment may be temporarily replaced by field expedients. A double-barrel oven may be used as a substitute for field ranges; a washing and sterilizing unit will make a satisfactory messkit laundry when immersion heaters and corrugated cans are not available; and oil drums and other containers

is responsible for camouflage discipline in the rear area. He must make sure that the diners do not congregate in large groups and must see that the following steps are taken to camouflage the installations and equipment in the area.

- a. All installations and equipment must be hidden from air observation.

b. The mess must be concealed from ground observation if it is operating close to the front-lines.

c. Mess personnel must be trained to prepare and serve food under blackout conditions.

d. Refuse, such as tin cans and litter resulting from the use of packaged rations, must be buried. The burial area should be camouflaged.

e. Equipment that might reflect light must be camouflaged; it should never be exposed to sunlight.

Section III. FORWARD AREA MESSING

60. General

The lines of combat change frequently; and the combat area is often subjected to heavy enemy fire, particularly during the daylight hours. Therefore, it is not feasible to establish even temporary unit messes in combat areas. When the tactical situation prohibits the use

of rear area messes by troops employed in combat, the troops should be fed in the combat area from a mobile kitchen truck or out of insulated food containers. Conditions permitting, the troops should be fed at least two hot meals per day and, if necessary, should have operational rations delivered for the third



Figure 18. Mobile kitchen.

meal. If meals are delivered to the combat area during daylight hours, the enemy may be able to establish the location of both combat and rear area installations by observing the movement of mobile kitchens. This problem can be solved by preparing the supper meal in the rear area or while the truck is in transit to the combat area; the truck can move up to the combat area under cover of darkness and the meal will be ready when the truck arrives at its destination.

61. Mobile Kitchen

The mobile kitchen (fig. 18) is a converted 2½-ton, 6 × 6, M-211 general-purpose truck and contains all equipment necessary to prepare, store, and cook food. The kitchen is provided with three types of equipment: organizational field mess equipment; special equipment, which must be constructed from available materials; and accessory equipment, which must be procured through channels. The truck tarpaulin may be modified to provide overhead cover on either side of the truck so that food and personnel in the serving line may be protected from sun or inclement weather. Whenever possible, the mobile kitchen is provided with a trailer to carry water-sterilizing bags, garbage cans, shovels, fly ropes and pegs, a ladder, cleaning equipment, nonperishable subsistence, and other supplies and equipment not needed while the truck is in transit.

a. Truck Conversion. Following are the procedures for converting the M-211 general-purpose truck into a kitchen truck.

- (1) Remove tarpaulin and bows.
- (2) Remove side panels and seats by extracting the panel stakes from the plates.
- (3) Transfer the right side panel to the left side of the truck and the left side panel to the right side of the truck. Position the panels so that the seats face outward; insert stakes to secure panels to stake plates. The seats can now be used for shelf space for pots, pans, and other items when meals are being served from the truck (fig. 18).
- (4) Raise bows about 24 inches. Mark bows at points where they emerge from their sockets.
- (5) Using the marks as a guide, drill

holes in both ends of the bows; insert nails or bolts through holes to hold bows in raised position.

- (6) Bolt three 1-inch by 1½-inch by 12-foot 3-inch hardwood strips to the underside of the bows. These strips will serve two purposes: They will brace the bows and will serve as safety bars which the men can grasp to keep from falling against the hot ranges if the truck should stop or swerve suddenly.
- (7) Construct a water-can rack (fig. 19). Position the rack along the left side of the truck interior and secure it to the truck body with clamps.
- (8) Replace tarpaulin and secure it to the truck.

b. Construction of Special Equipment. Special equipment consists of duckboards for truck floor (fig. 19), a kitchen cabinet (fig. 20), a ladder (fig. 19), and a collapsible serving table (fig. 25).

- (1) The kitchen cabinet, which must be constructed from available materials, should incorporate a worktable, ice chest, food chest, weapons rack, breadbox, and utensil and utility storage compartments (figs. 20-23). The frame of the cabinet illustrated is made of 1½-inch lumber. The outside walls are made of ¾-inch plywood; the shelves and partitions, of ½-inch plywood. The interior surfaces of the ice chest and food chest are lined with tin, and a hole has been bored in the bottom of the ice chest to allow for drainage of water. The condiment rack is made of ¾-inch lumber. The surface of the worktable is made of ⅛-inch masonite and is framed with a strip of lumber 1 inch wide and ½-inch thick. The sliding doors are also made of ⅛-inch masonite. The cabinet should be given two coats of paint to preserve the wood. A flat enamel, which will not reflect light, should be used for the second coat. The color of the paint should be olive drab. If the worktable is made of plywood, it should be painted; if it is made of raw wood, it should be left

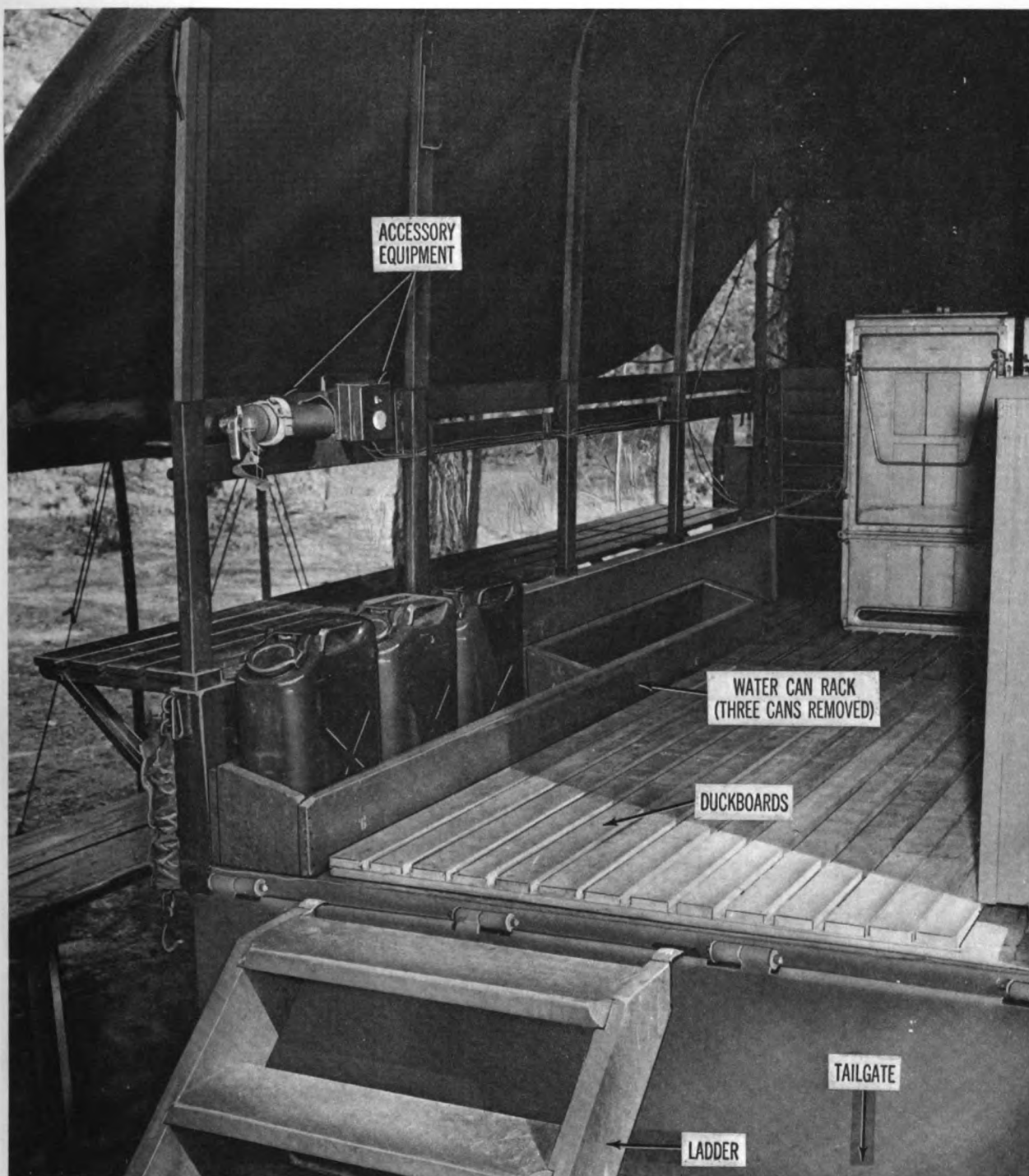


Figure 19. View of kitchen truck showing water-can rack, duckboards, accessory equipment, and ladder.

unpainted. After the cabinet has been constructed and painted, it is positioned along the right side of the truck interior (fig. 18).

(2) The ladder permits easy passage in

and out of the kitchen truck. The ladder is hooked to the truck tailgate when the truck is in use (fig. 19) and is stored in the trailer when the truck is in transit. Figure 24 shows ladder

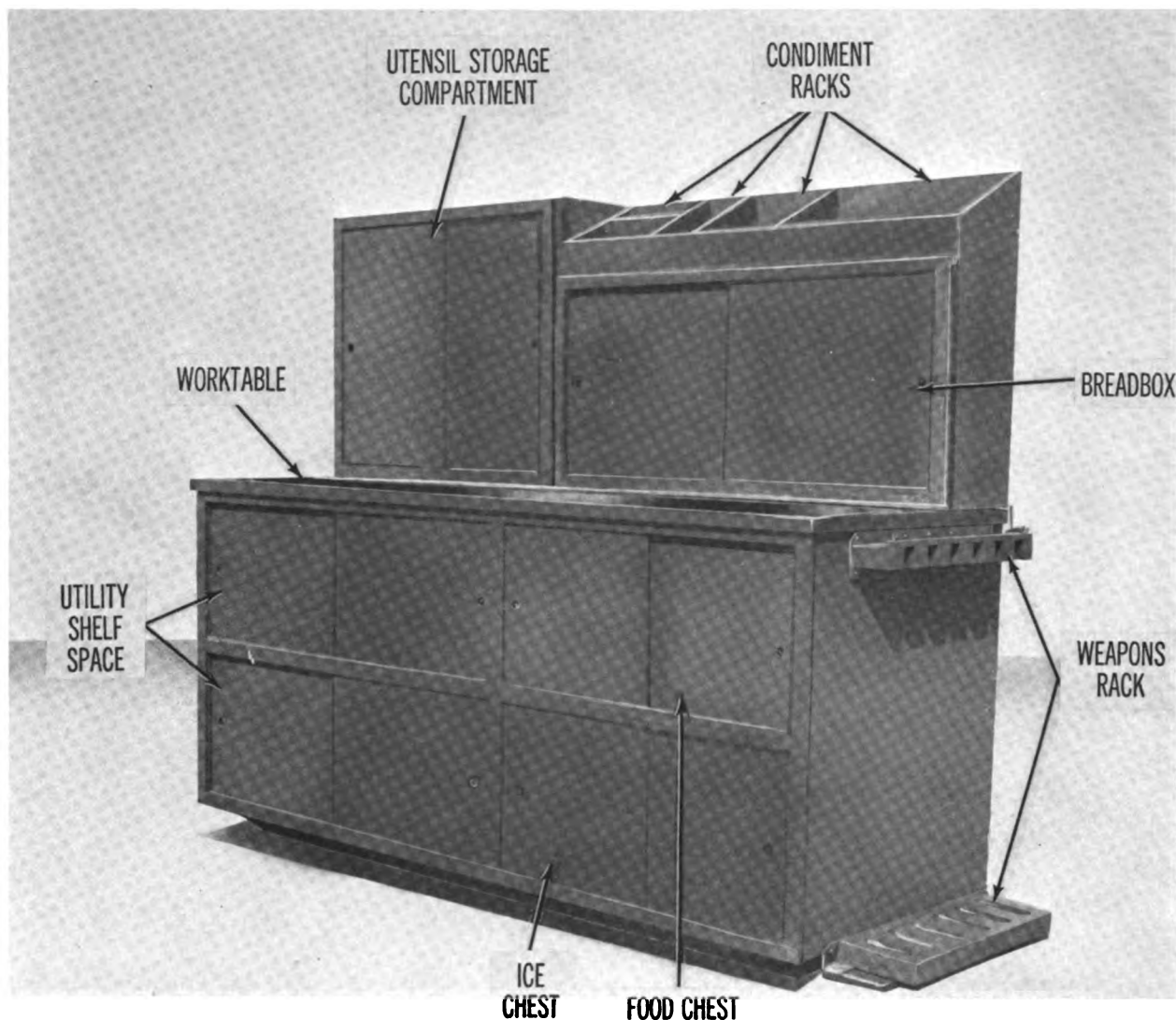


Figure 20. Kitchen cabinet.

construction details. The ladder should be painted and the steps sprinkled with sand while they are still wet. The sand will insure proper footing.

- (3) A table, which can be set up outside to hold serving pots during the time that meals are being served and folded for compact storage when not in use, must be constructed. Straps must be provided for the purpose of securing the folded table to the left side of the truck just above the panel. The table shown in figure 25 is approximately 10 feet long and 31 inches high. The top is made of two 12-inch boards spaced three-quarters of an inch apart.

c. Accessory Equipment. Mobile kitchen accessory equipment (fig. 26) consists of a horn button, which is used to signal the driver when the truck is in operation; a lamp (fig. 18), which provides light for the interior of the truck when meals are being prepared under cover of darkness; a switchbox, from which the lamp and horn are operated; and a fire extinguisher. The switchbox, lamp, and horn button should be installed by motor pool personnel. The lamp should be attached to the center of the forward bow. The switchbox and fire extinguisher should be mounted on the left side of the truck in the rear. All mess personnel should be taught how to operate the fire extinguisher.

d. Organizational Equipment. Organizational equipment consists of gasoline field range outfits (app. C), a gasoline field range accessory outfit, water cans, and gasoline cans. To install field ranges, secure end ranges to center range with spring-loaded latches; then, using chains and turnbuckles, secure end ranges to front bow sockets (fig. 27).

e. Tent Flies. Tent flies may be made as follows:

- (1) Remove truck tarpaulin. Sew a piece of canvas that is the length of the tarpaulin and 8 feet wide to the under-

side of each side of the tarpaulin. Sewing the canvas to the tarpaulin in this manner will prevent seepage of rain. Use at least two rows of stitching.

- (2) Insert grommets in the edge of each piece of canvas. Place one grommet at each corner and space the other grommets about 2 feet apart.
- (3) When the flies are not in use, they should be rolled up on the inside of the truck tarpaulin; the edges of the tarpaulin should be attached to the

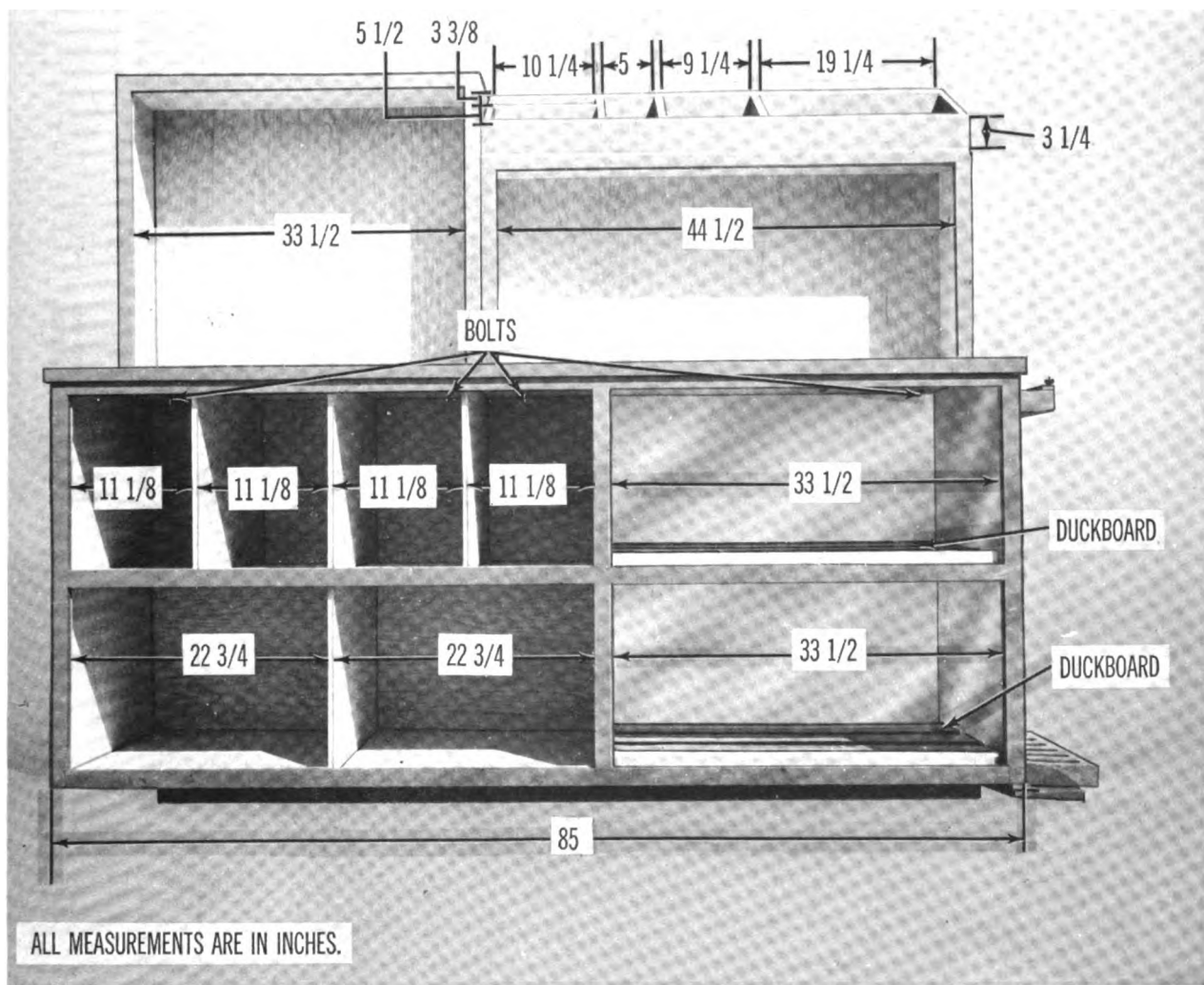
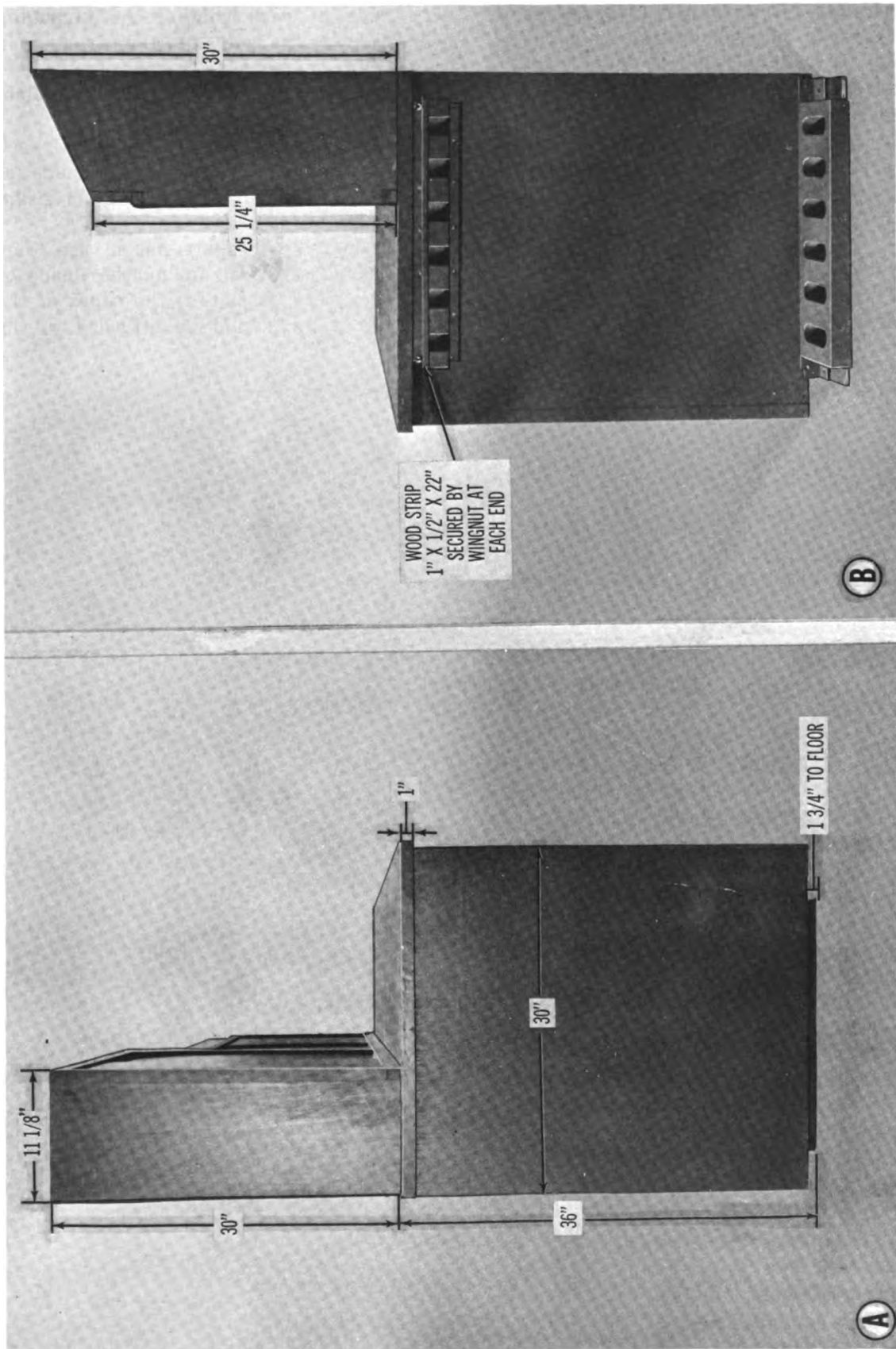


Figure 21. Front view of kitchen cabinet, doors removed.



A.—Left side
B.—Right side

Figure 22. Side views of kitchen cabinet.

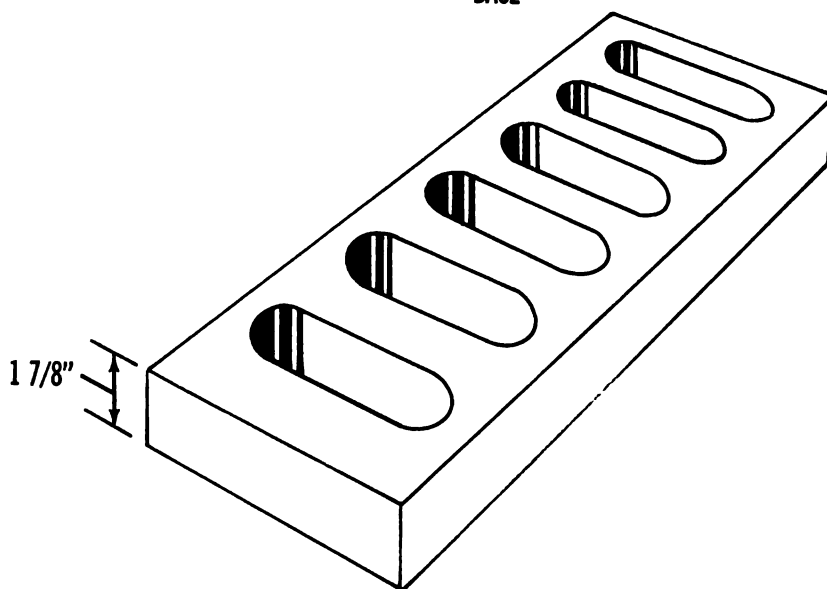
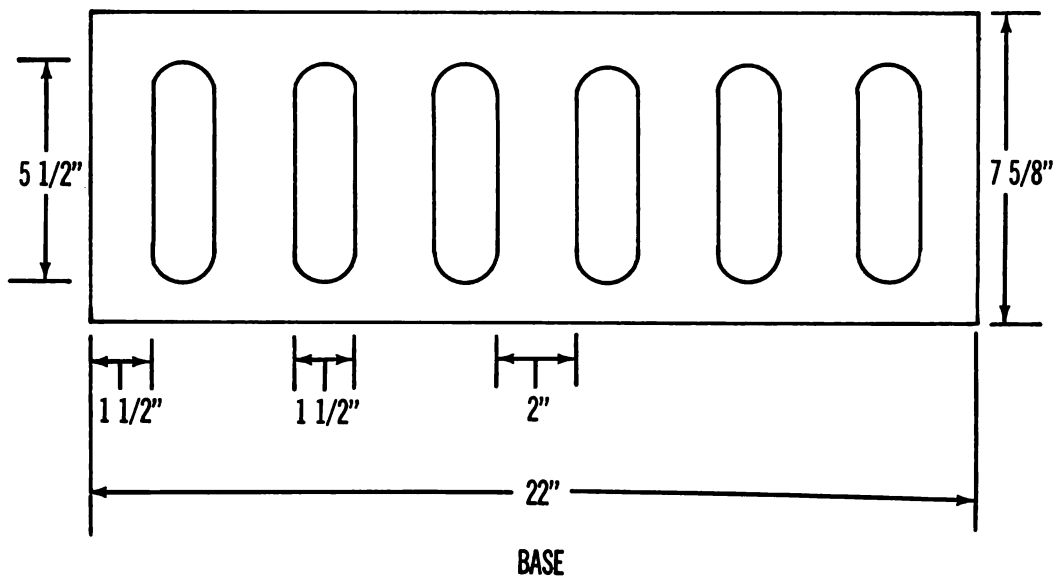
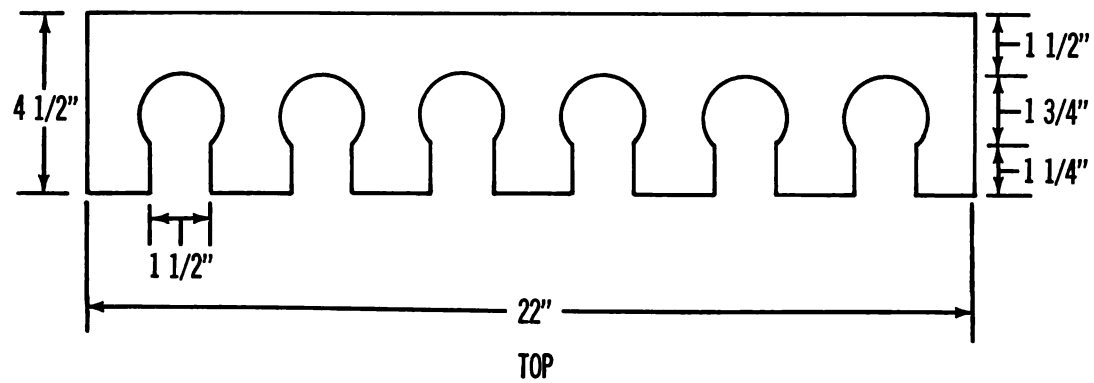
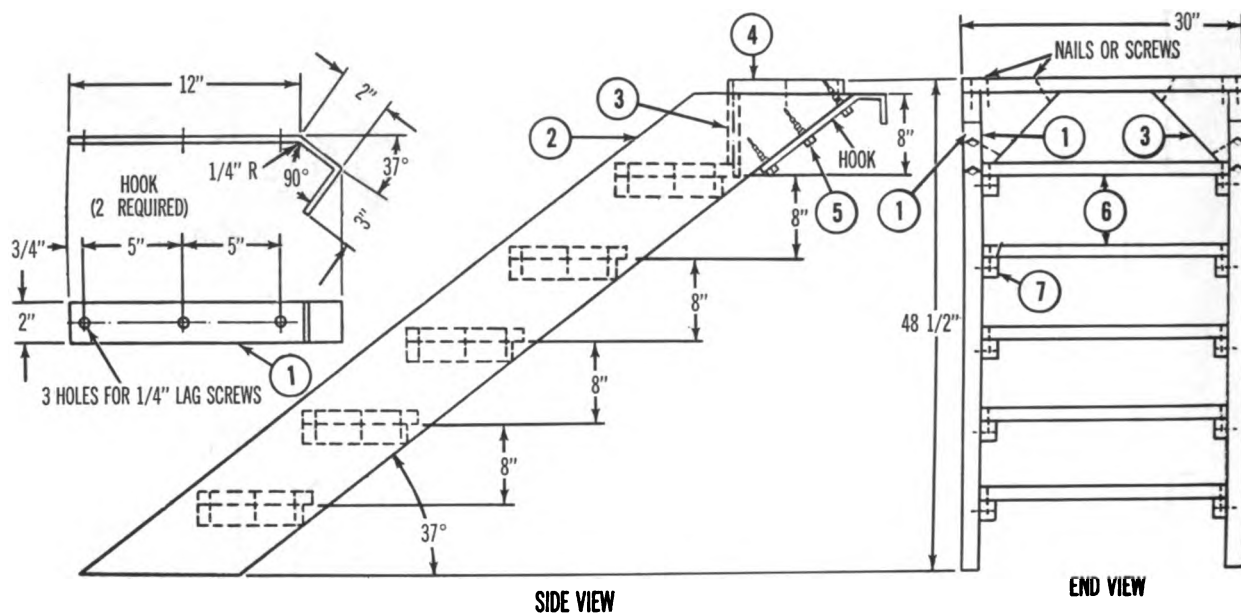


Figure 23. Weapons rack for kitchen cabinet, construction details.



Materials Required	No. Pieces	Materials Required	No. Pieces
1 Steel, 1/4 in. thick X 2 in. X 17 in.	2	5 Screw, lag, 1/4 in. diameter X 3 in., steel	6
2 Wood, 2 in. X 10 in. X 7 ft. 8 in.	2	6 Wood, 1 3/8 in. X 12 in. X 26 in.	5
3 Wood, 1 3/8 in. X 6 in. X 8 in.	2	7 Wood, 1 3/8 in. X 1 3/4 in. X 11 in.	10
4 Wood, 1 3/8 in. X 12 in. X 30 in.	1		

Figure 24. Ladder construction details.



Figure 25. Collapsible serving table.

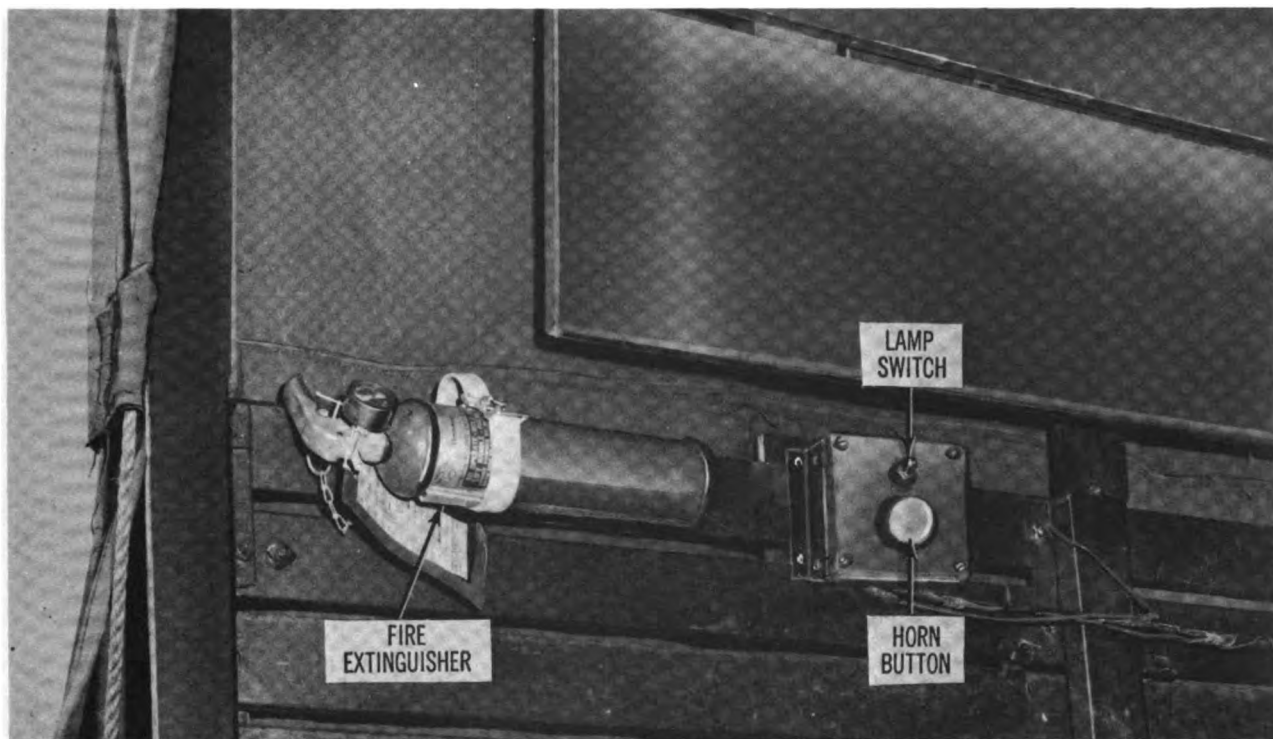


Figure 26. Accessory equipment installed.

- truck in the usual manner (fig. 28).
- (4) To put flies in use, unroll and extend them from the sides of the truck. Insert the end of a 6-foot tent pole into each grommet and pull poles to a vertical position. Drive tent pegs into the ground. Tighten guy lines around tent pegs until fly is fully extended (fig. 29).

62. Food Preparation and Cooking

Although it is desirable for mess personnel to prepare the supper meal in the rear area, it will sometimes be necessary for them to prepare this meal, at least in part, while the kitchen truck is en route to the combat area. Careful plans must be made for such an emergency. Plans should take into consideration the distance to be traveled, the condition of the roads to be used, the type of food to be prepared, the cooking methods contemplated, and the amount of time available after the truck has reached its destination. The mess steward must train mess personnel to prepare and cook food in a moving truck; he must stress safety measures. Cooking may be done by almost any method ex-

cept deep-fat frying. Foods should never be deep-fat fried while the truck is moving because sudden stops or jerky movements of the truck may cause hot grease to splash on personnel and cause serious injury. Truck vibration prevents the preparation of cakes and yeast-leavened doughs, but pies and biscuits may be baked en route.

63. Serving

When food is served from the kitchen truck, procedures used in garrison messes should be followed as closely as possible. Emphasis should be placed on portion control because the supply of food in the kitchen truck is limited to the actual needs of the troops to be fed; the serving line cannot be backed up with leftovers, as is the case in the garrison mess. The use of the staggered serving line is recommended for two reasons: It speeds up serving because two lines can be served at the same time, and it spreads out the troops, thereby reducing the number of casualties should the enemy attack while serving is in progress. However, if the weather is inclement and if the danger from enemy fire is not imminent, the serving line may be set up

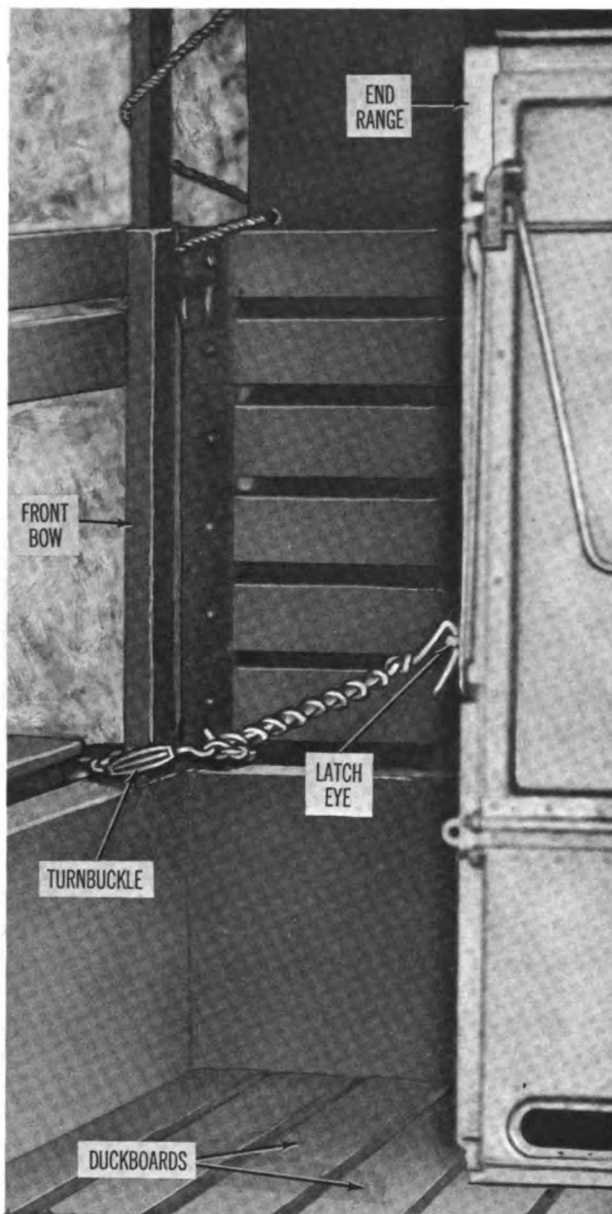


Figure 27. End range secured to front bow socket.

under the extended tent fly and the food served from the collapsible serving table. A typical combat area mess layout is shown in figure 30.

64. Sanitation

Because of limited facilities in the combat area, the use of proper sanitary measures is even more important than it is in the garrison mess. Every precaution must be taken to see that food and mess gear do not become contaminated.

a. Transportation of Rations. The vehicle de-



Figure 28. Kitchen truck with tarpaulin attached to sides.

signed to transport rations, including ice, from the source of supply to the using mess must be clean; at no time should the rations be allowed to come in contact with the bed of the truck. Suitable containers and dunnage sufficient to protect the food in transit should be provided, along with a tarpaulin with back flap or cover.

b. Messkit Predip. A corrugated can containing boiling water should be placed at the head of the serving line so that messkits may be predipped (fig. 30). Predipping will sanitize messkits and in cold weather will give them a desirable warmth.

c. Protection from Flies. In areas where flies are present in large numbers, special care must be taken when food is being served. Food servers should keep covers on serving containers except when they are actually placing food in the soldiers' messkits. Only the bottom section of the messkit should be used for food. Each man should use the top of his messkit to cover his food between servings of individual

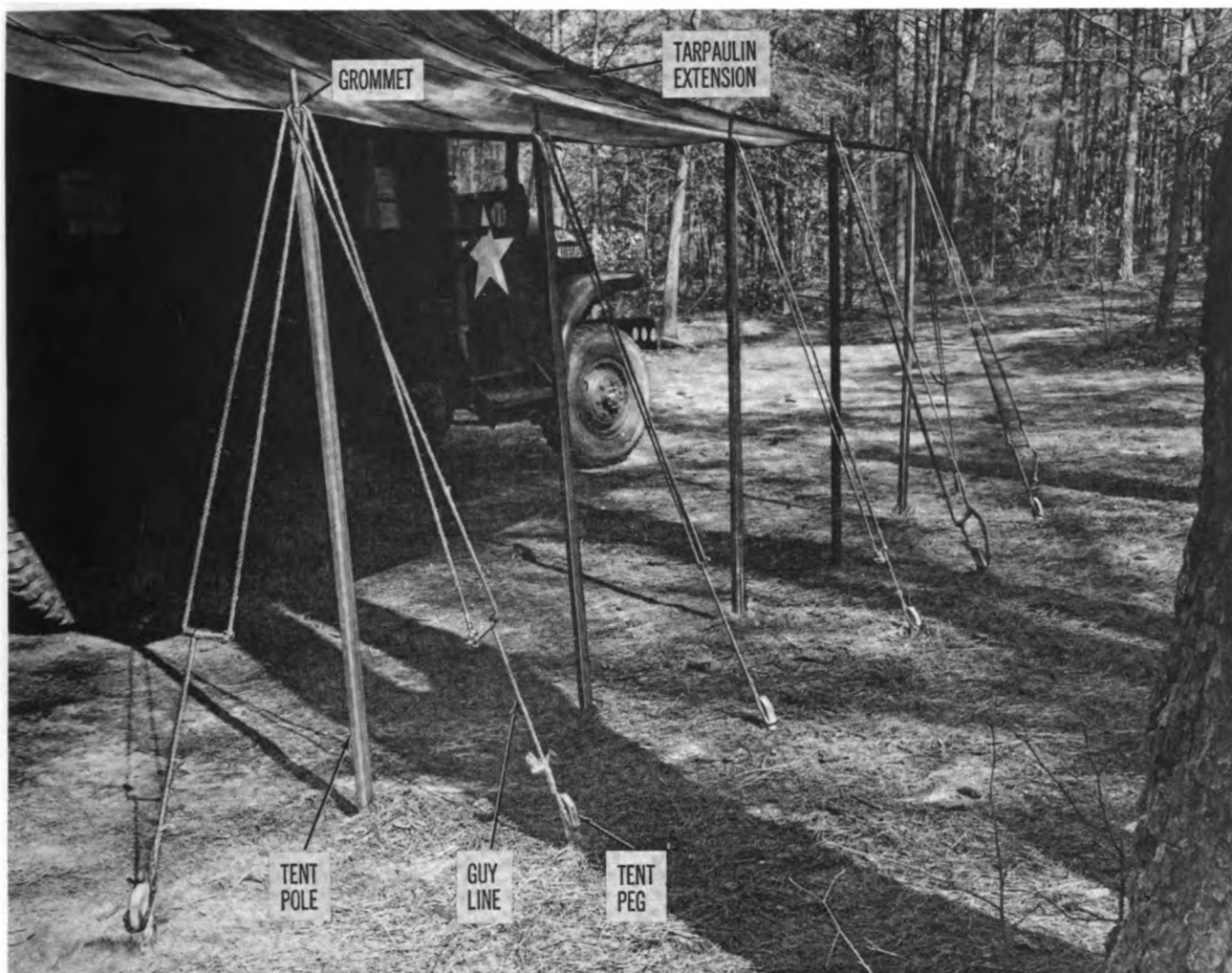


Figure 29. Tent fly fully extended.

items. He should keep his food covered while he is eating his meal, removing the top only to take a forkful of food.

d. Messkit Laundry. The messkit laundry and its operation are described in appendix B. This appendix also includes information on the use of disinfectants in field dishwashing when it is impossible to heat water to the proper temperature for sanitizing mess gear.

e. Waste Disposal. Normally in a combat

situation, a corrugated can is used as a garbage receptacle; the garbage is returned in the can to the rear area for disposal. If the situation permits, a garbage disposal pit may be dug. The depth of the pit will depend on the number of meals expected to be served. One foot of cover for each meal to be served plus 2 feet of top cover should be allowed. A 4- by 4-foot hole will fill up at the rate of 1 foot per meal for every 100 persons served.

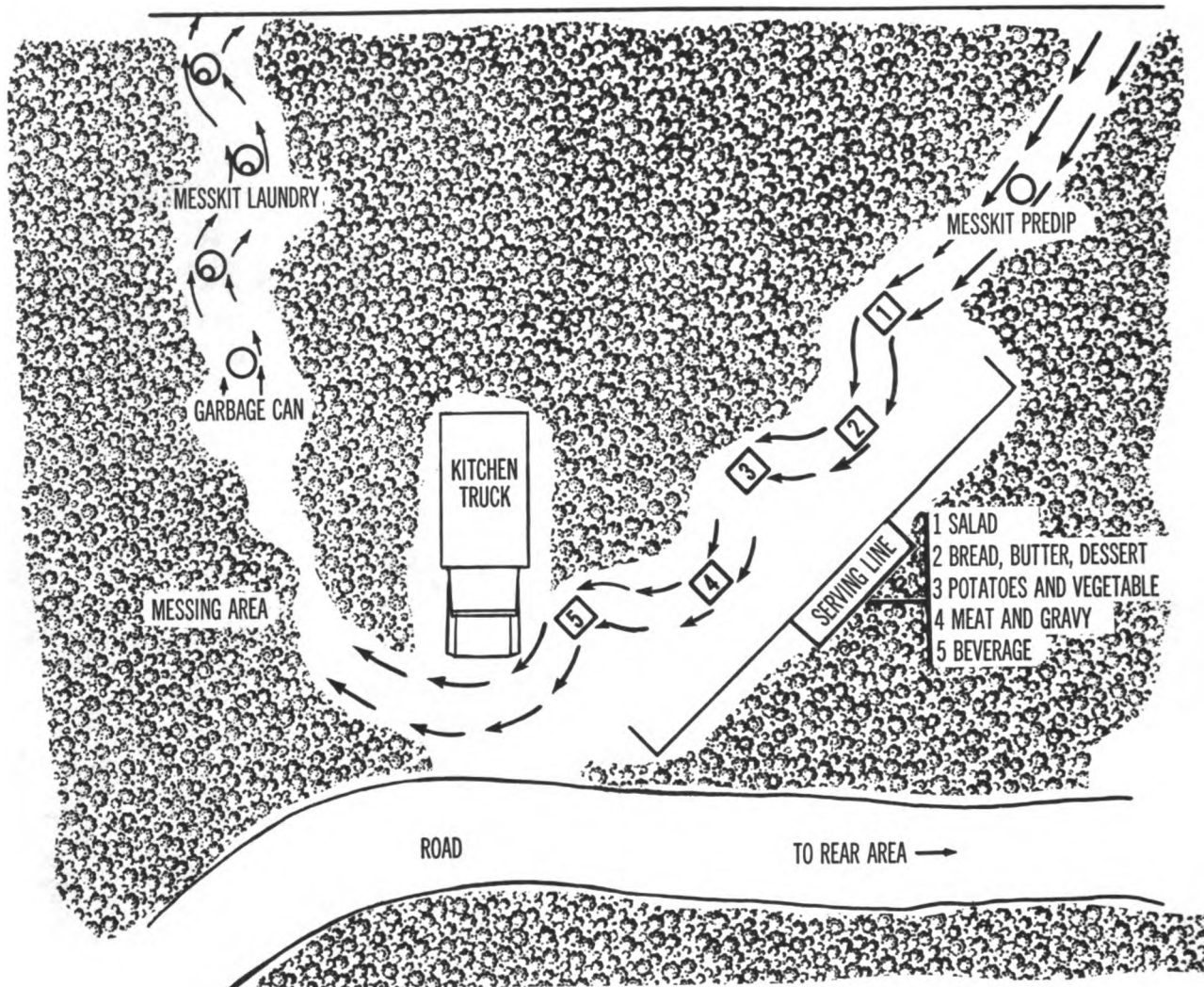


Figure 30. Typical combat area mess layout.

CHAPTER 4

RAILWAY KITCHEN CAR OPERATIONS

Section I. GENERAL

65. Methods of Subsisting Troops

During rail movements, troops may be subsisted in one of three ways: by means of box lunches; by means of meal tickets, as prescribed by current regulations; or by means of one or more kitchen cars, as required. A combination of factors, including the number of troops to be moved, the nature of their mission, and the length of time they will be in transit, determines which of the three methods will be used.

66. Kitchen Cars

Normally, troop kitchen cars or kitchen baggage cars are used for subsisting troops during rail movements when the group numbers 100 or more persons and the schedule of movement is such that a minimum of 3 meals will be required. However, there may be instances when kitchen cars will be operated for fewer than 100 persons or for less than 3 meals. When kitchen cars are required, the Commander, Military Traffic Management and Terminal Service (MTMTS), determines, on the basis of car availability, whether troops will be subsisted by means of troop kitchen cars or kitchen baggage cars. Up to 250 persons can be fed from one kitchen car during each meal period.

a. Troop Kitchen Car. The troop kitchen car is an especially designed and constructed rail-

way car intended for use as a kitchen car only. All major items of equipment, including ranges, iceboxes, wash sinks, hot- and cold-water tanks, and other facilities are permanent parts of the car. Temporary equipment required for a troop kitchen car is restricted to pots, pans, and utensils. The temporary equipment authorized is listed in TA 50-911 and TA 50-986.

b. Kitchen Baggage Car. A kitchen baggage car is a railway baggage car converted for use as a kitchen car. It is temporarily provided with all necessary cooking equipment, water storage facilities, improvised iceboxes, cook's worktables, and fuel containers. Procedures for setting up a kitchen baggage car are contained in section III.

67. Troop Movement Order

The troop movement order is the train commander's authority for drawing equipment, supplies, and subsistence for the kitchen car. The order states the number of enlisted personnel, officers, and warrant officers involved, the length of the journey or travel time, and the total number of meals to be furnished. If the kitchen car is to be discontinued en route, the order also states the point at which the car will be discontinued. The number of enlisted persons to whom meal tickets will be issued after discontinuation of the kitchen car is also shown.

Section II. ISSUE AND DISPOSITION OF EQUIPMENT

68. Issue of Equipment

a. The Assistant Chief of Staff, G4, or the director of supply or other staff officer responsible for the supply function at the installation

of origin (hereinafter referred to as the director of supply) is responsible for providing the train commander with the equipment required for the kitchen baggage car (para. 71) or

the troop kitchen car (para. 66a). Whether the equipment is to be returned to the installation of origin or is to be retained at the troop movement destination, it is issued on DA Form 2765 or 2765-1 (Request For Issue or Turn-In) whichever is appropriate.

b. If the installation of origin requires return of the equipment for the purpose of maintaining stock levels or of handling recurring troop movements, the equipment is issued on a temporary loan basis. When return of the equipment is required, the containers needed for the return shipment should be provided by the installation of origin and should be placed on the troop train prior to its departure. TM 38-230 covers methods of packaging and packing equipment for shipment.

69. Responsibilities of Train Commander with Regard to Equipment

a. The kitchen car and its equipment must be kept clean, sanitary, and in good condition during the entire period of travel. If necessary, the train commander may request engineers and directors of supply along the route of travel to assist him in maintaining the equipment. If a particular item cannot be repaired or serviced within a reasonable amount of time, the train commander may, in an emergency, request a replacement for the defective item from the director of supply of the installation that renders the emergency service. In some instances, emergency service and repairs may be performed by Air Force installations on a reimbursable basis.

b. Before the train commander turns in the equipment at the installation of destination

(para. 70), he must determine, whether any item of equipment has been lost, damaged, or destroyed. If any item has been lost, damaged, or destroyed, the train commander must initiate the appropriate action in accordance with procedures in AR 735-11.

70. Disposition of Equipment

a. *Equipment to be Retained at Troop Movement Destination.* If kitchen car equipment is to be retained by the installation of destination, the troop train commander turns in such equipment to the director of supply at the troop movement destination on DA Form 2765 or 2765-1. If a report of survey is required (para. 69b), copies of the form are attached to the copy of the turn-in document that is retained by the officer assuming accountability for the equipment at the point of destination.

b. *Equipment to be Returned to Installation of Origin.* If kitchen car equipment is to be returned to the installation of origin, the troop train commander turns in the equipment to the director of supply at the troop movement destination on DA Form 2765 or 2765-1, and the director of supply returns the equipment to the installation of origin on DD Form 1348-1 (DOD Single Line Item Release/Receipt Document). The installation engineer is responsible for packing the equipment in the containers furnished by the installation of origin, and the installation transportation officer is responsible for shipping the equipment. Improvised equipment (para. 71b) used during the troop movement is not returned to the point of origin but is retained by the troop movement destination for use in future troop movements.

Section III. KITCHEN BAGGAGE CAR

71. Equipment Required

a. *Expendable and Nonexpendable Equipment.* The following items of expendable and nonexpendable equipment are required for each kitchen baggage car. The number of personnel expected to be subsisted determines the quantities of the various items of equipment required.

- (1) Gasoline field range outfits, M1937 or M59 (app. C). Three range outfits are

sufficient for preparing the food for 250 persons; however, an additional range is required for heating water.

- (2) One gasoline field range accessory outfit (app. C).
- (3) Galvanized metal ash and garbage cans and metal pails, as authorized in TA 50-986. The 32-gallon galvanized cans are used as receptacles for garbage and for storage of the water that

is used for cleanup. The 3½-gallon pails are used as receptacles for waste from the cook's worktables and as containers for sand that may be needed to smother grease fires resulting from operation of the ranges.

- (4) Five-gallon gasoline cans of either the military or the safety type. Usually the gasoline used in kitchen baggage cars is stored in military gasoline cans. However, if this type of can is not available, safety cans may be used.
- (5) Aluminum insulated food containers of 5-gallon capacity, which are used for carrying the food from the kitchen car to the various troop cars (para. 86a).
- (6) Five-gallon military water cans, which are used to store the water needed

during the journey for drinking and cooking.

- (7) One carbon dioxide type and one foam type fire extinguisher.

b. Improvised Equipment.

- (1) *Cook's worktables.* Two cook's worktables are required. The tables should be at least 6 feet long, 2 feet 6 inches wide, and 3 feet high. A typical improvised table is shown in figure 31.
- (2) *Ice chest.* An ice chest may have to be improvised if a 200-pound-capacity ice chest, such as the one authorized in TA 50-911 for garrison messes, is not available. The ice chest shown in figure 32 is adequate for storing perishable supplies. It is a sturdy wooden box that is properly drained; it is proportioned to provide a maximum

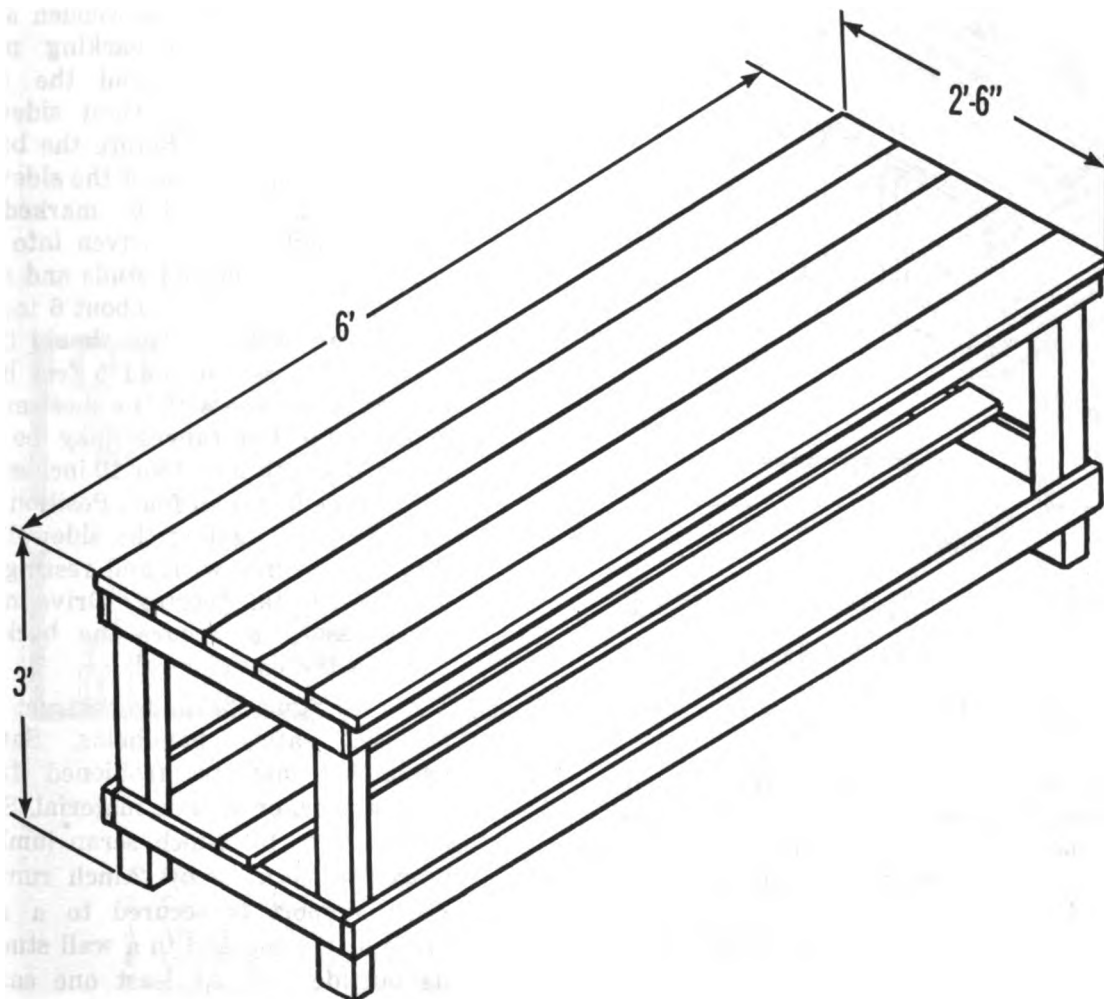


Figure 31. Improvised cook's worktable.

surface of ice for direct-contact storage of perishable items.

72. Installation of Equipment

The installation engineer is responsible for the proper installation of equipment in kitchen baggage cars. Equipment layouts will vary according to the type of kitchen baggage car issued for use with the troop train. Layouts for the 4-door baggage car (fig. 33) and the 6-door baggage car (fig. 34) are typical. Equipment must be installed so that car doors are not blocked and kitchen personnel traffic may flow

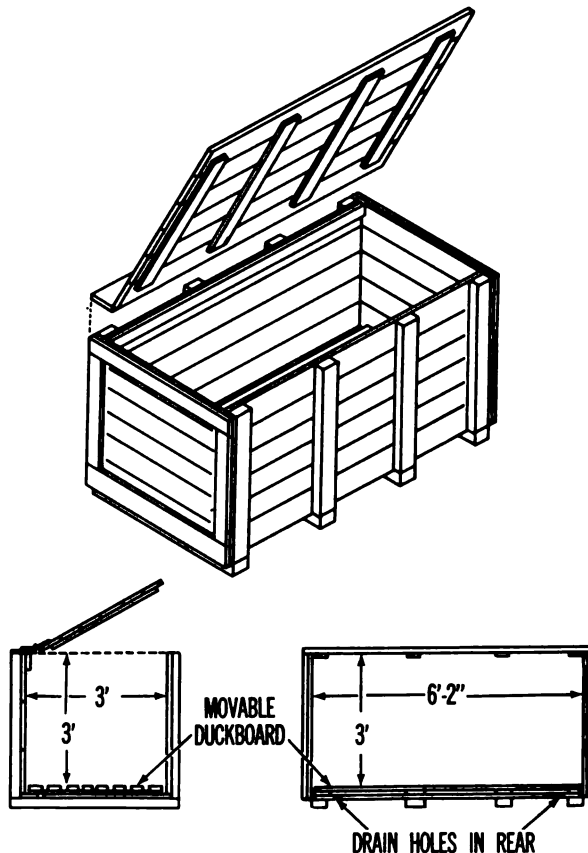


Figure 32. Improved ice chest.

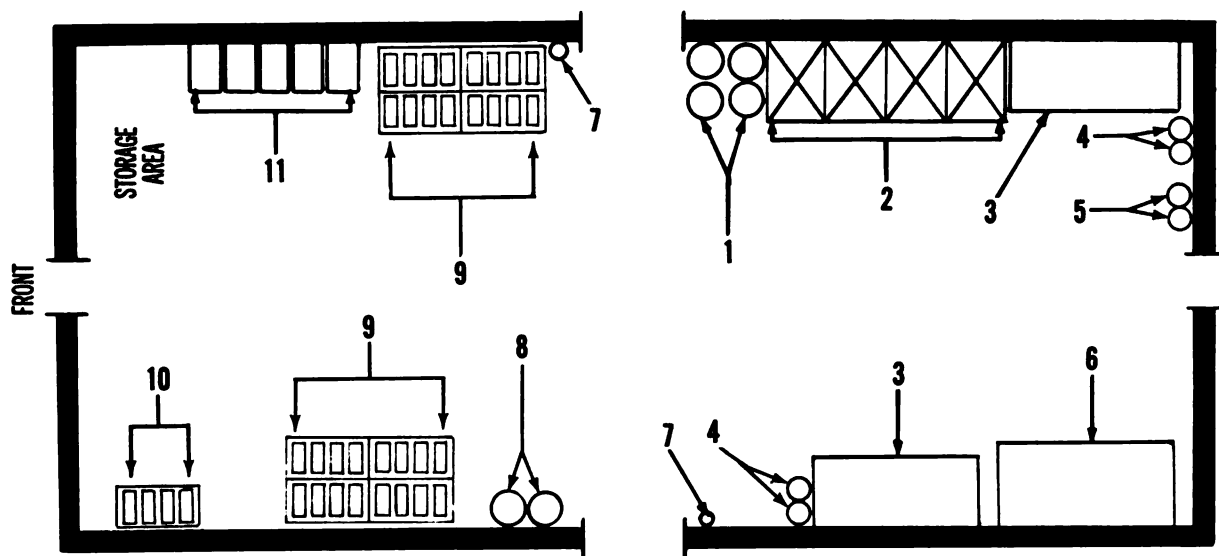
as smoothly as possible. Usually, supplies are stored in the front end of the car, and ranges and other food storage and preparation equipment are installed from the center section to the rear end of the car. A commissioned officer must supervise the installation of kitchen baggage car equipment.

a. *Orientation.* As used in these instructions, the terms "right," "left," and "rear" are from

the position of the individual standing in the center of the car facing its "front" end. The "front" end of the car is the end facing the direction in which the car is to travel.

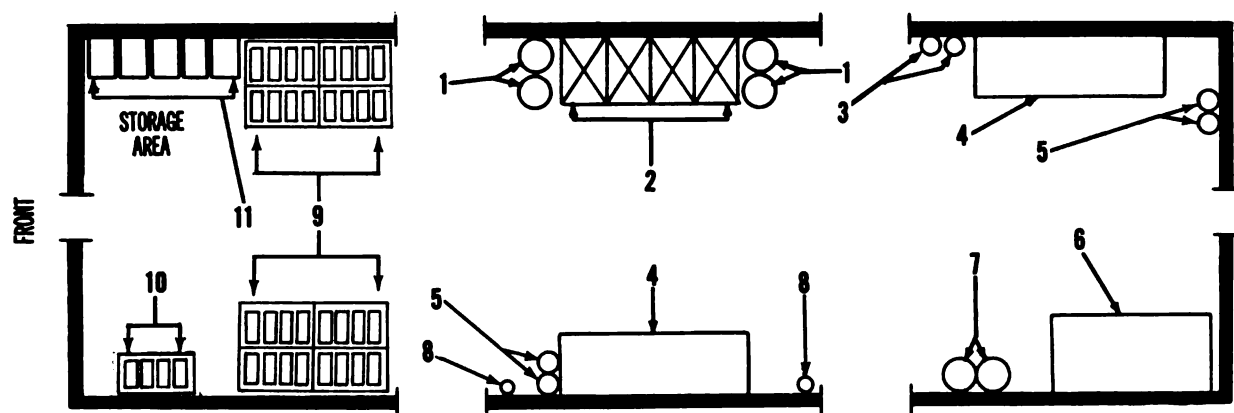
b. *Field Ranges.* Refer to figure 35 and install field ranges as follows:

- (1) Using sheet metal of 20 gage or heavier, install a protective flooring for the ranges. When four ranges are used, the flooring should measure 8 feet 2½ inches by 2 feet 8 inches, and its outside edge should be flush with the right sidewall of the car. When fewer than four ranges are used, the length of the flooring may be reduced by 1 foot 10 inches for each range less than four. Secure the sheet-metal flooring to the baggage car floor with nails spaced about 6 inches apart.
- (2) If the baggage car has wooden sidewalls, a sheet-metal backing plate must be installed behind the field ranges to protect the right sidewall from heat or flame. Before the backing plate is placed against the sidewall for nailing, it should be marked so that the nails will be driven into the centers of the sidewall studs and stud braces. Nails should be about 6 inches apart. The backing plate should be 8 feet 2½ inches long and 5 feet high and, as is the case with the sheet-metal flooring for the ranges, may be reduced in length by 1 foot 10 inches for each range less than four. Position the backing plate against the sidewall so that it is in line with and resting on the sheet-metal flooring. Drive nails as necessary to secure the backing plate to the car sidewall.
- (3) Refer to figure 36 and construct improvised safety handholds. Safety handholds may be fashioned from rope, straps, or similar material. Supports are 2- by 4-inch scrap lumber, braced with a 2- by 2-inch runner. Each support is secured to a roof brace at the top and to a wall stud at its outside end. At least one safety handhold must be provided above each range.



- | | |
|--------------------------------|------------------------------------|
| 1 32-gallon cans for water | 7 Fire extinguishers |
| 2 Gasoline field ranges | 8 32-gallon cans for garbage |
| 3 Improvised cook's worktables | 9 5-gallon military water cans |
| 4 3½-gallon pails for waste | 10 5-gallon military gasoline cans |
| 5 3½-gallon pails for sand | 11 Insulated food containers |
| 6 Ice chest | |

Figure 33. Layout of 4-door kitchen baggage car equipped for feeding 250 persons.



- | | |
|--------------------------------|------------------------------------|
| 1 32-gallon cans for water | 7 32-gallon cans for garbage |
| 2 Gasoline field ranges | 8 Fire extinguishers |
| 3 3½-gallon pails for sand | 9 5-gallon military water cans |
| 4 Improvised cook's worktables | 10 5-gallon military gasoline cans |
| 5 3½-gallon pails for waste | 11 Insulated food containers |
| 6 Ice chest | |

Figure 34. Layout of 6-door kitchen baggage car equipped for feeding 250 persons.

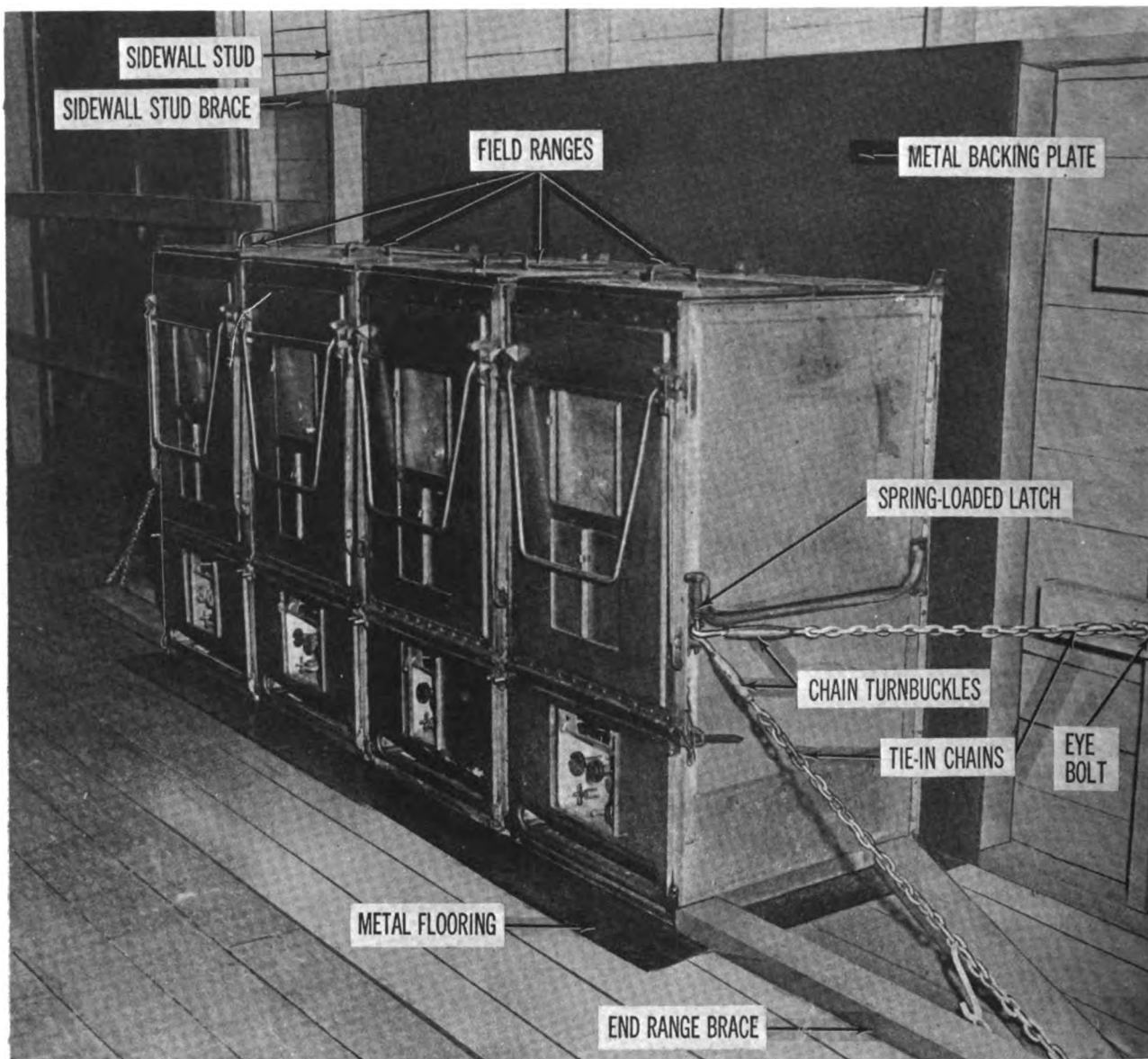


Figure 35. M1937 gasoline field ranges installed in baggage car.

- (4) Position field ranges in a row on the sheet-metal flooring. Backs of ranges should be about 2 inches out from the right sidewall of the car. Ranges at the ends of the row should be about 4 inches inside the edges of the sheet-metal flooring. Latch ranges together with the spring-loaded latches provided for this purpose. If ranges are properly positioned, metal flooring should extend about 4 inches in front of the ranges.
- (5) Refer to figure 37 and construct improvised end range braces and tie-in

- chain anchors. Scrap 2- by 4-inch lumber may be used for this purpose. Position the end braces as indicated and secure them to the car floor with sixteenpenny nails or lag screws. Position chain anchors on end braces and secure them to the end braces with sixteenpenny nails or lag screws.
- (6) Pull up on spring-loaded latch pins; then lower pins through eyes of turnbuckles at ends of tie-in chains. Pass hook ends of tie-in chains under and over the chain anchors. Pull hooks toward cabinets until most of the

slack has been taken out of the chains; then pass ends of hooks through nearest chain links. Adjust turnbuckles on tie-in chains until all slack has been removed and chains are taut.

- (7) Install a $\frac{1}{2}$ -inch eye bolt in the sidewall stud that is nearest each end range. Attach an additional tie-in chain to each end range and to the corresponding eye bolt (fig. 35).

c. Galvanized Cans.

- (1) *Cans used for garbage.* The cans used for garbage should be located on the left side of the car and near the car door (figs. 33 and 34). Secure cans to the sidewall as described in (2) below.
- (2) *Cans used for water storage.* The cans used for water storage (figs. 33 and 34) should be located near car doors to facilitate emptying or refilling. For cans that are located against the car

sidewall, pass wire loops through can handles and attach loops to car sidewall with hooks or bent nails (fig. 38). If cans are arranged as shown in figure 33, pass a strong wire through the inside handles of the outside cans and through the outside handles of the cans that are secured to the wall, thus connecting all cans at the center of the group of four. Twist ends of wire together to secure.

- (3) *Splashboards.* Water stored in 32-gallon cans may splash over the sides of the cans when the car is in motion. Improvised splashboards (fig. 39) will reduce such splashing to a minimum. Splashboards should be round and made of clean, smooth lumber. The diameter of the splashboards should be slightly less than the diameter of the 32-gallon cans, so that the splash-

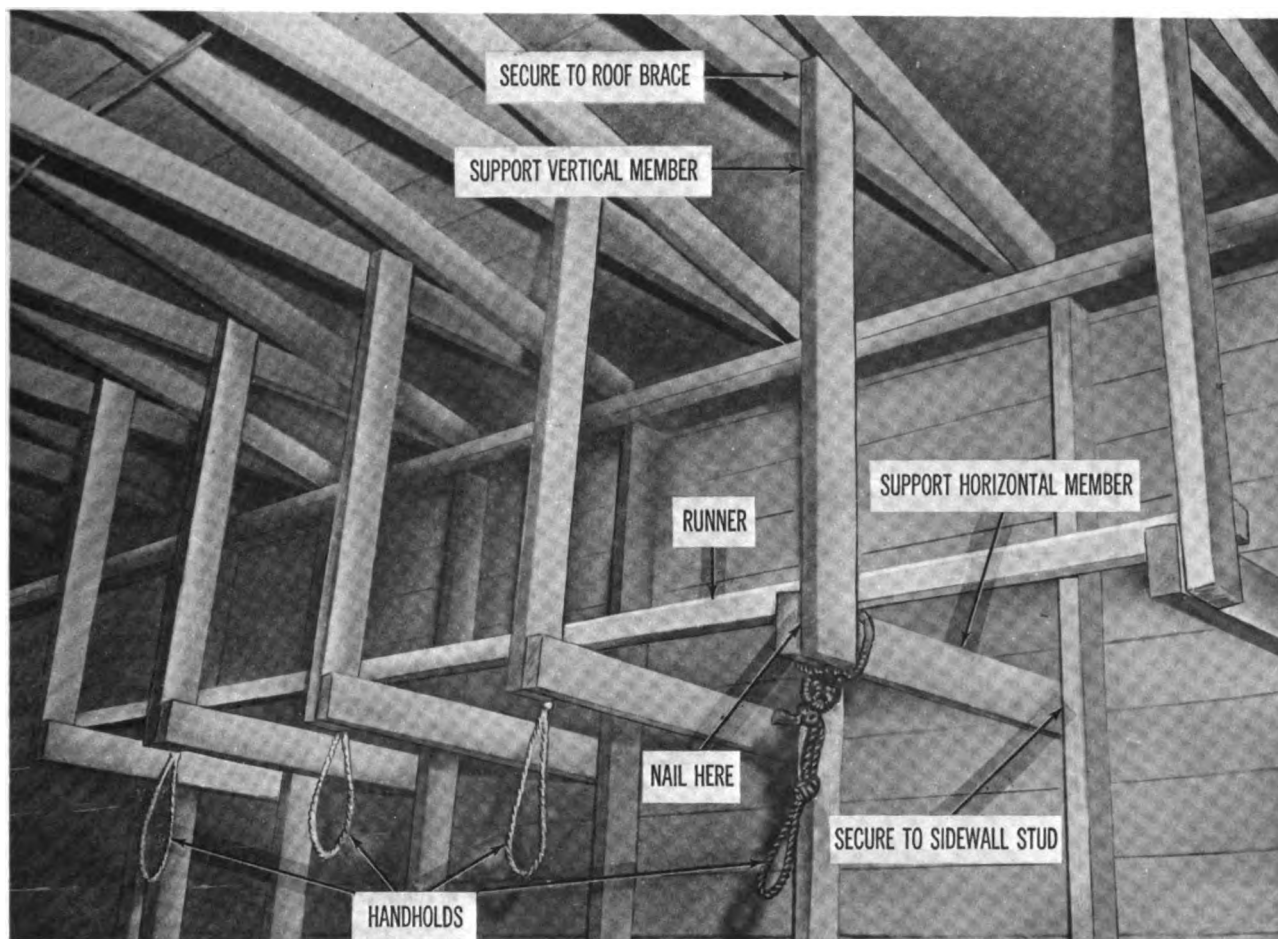
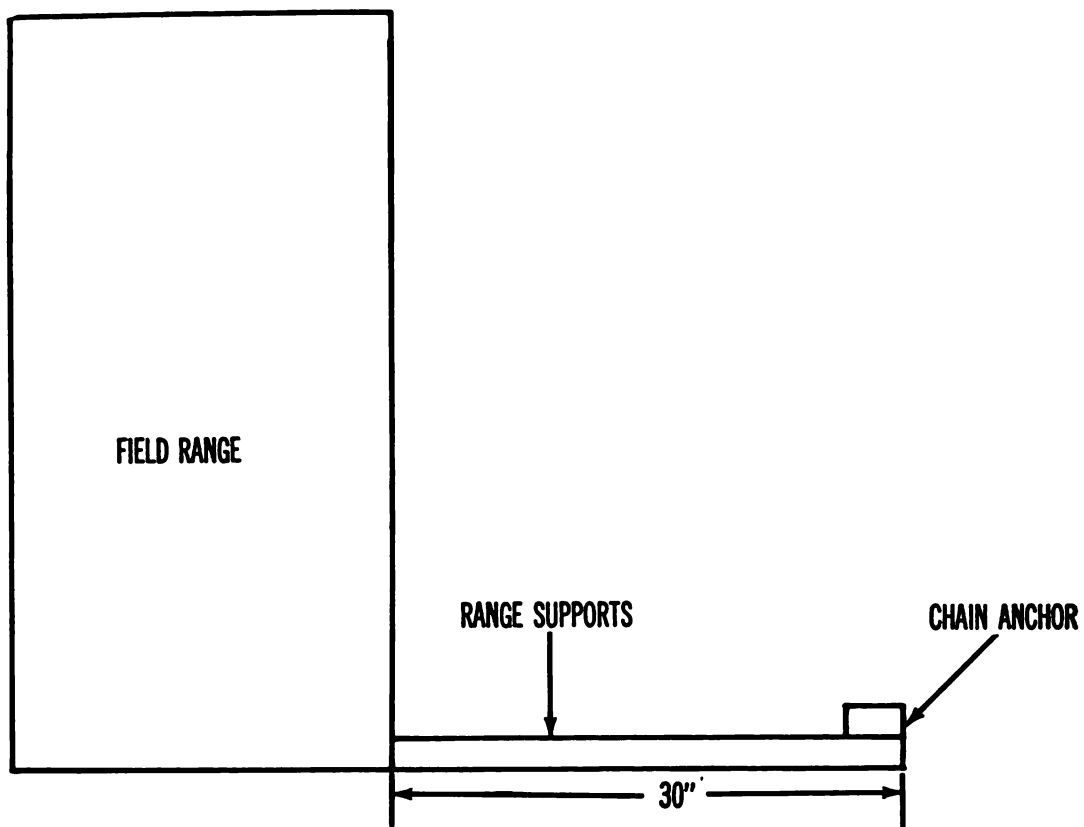
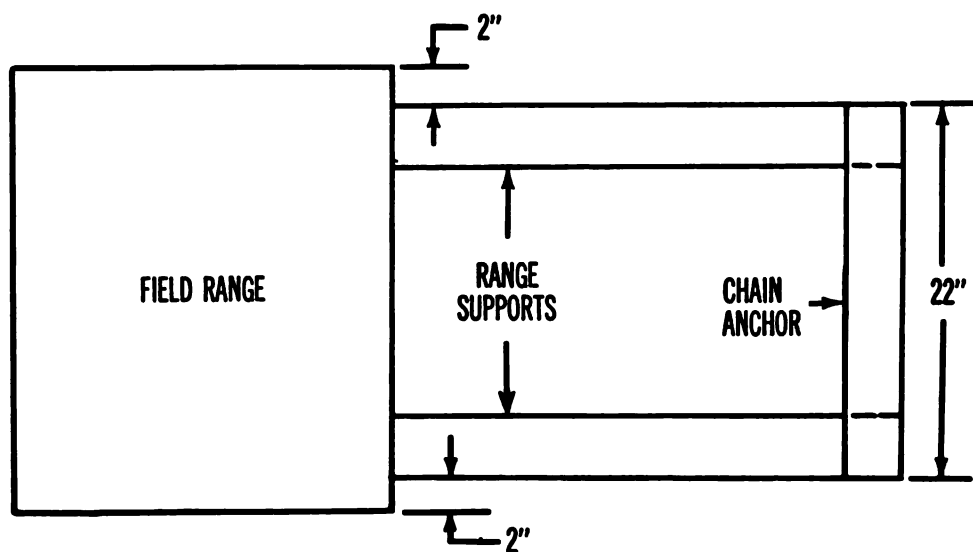


Figure 36. Improvised safety handholds.



FRONT VIEW



TOP VIEW

Figure 37. Improvised end range brace and tie-in chain anchor.

TWIST WIRE BOTH
SIDES OF NAIL

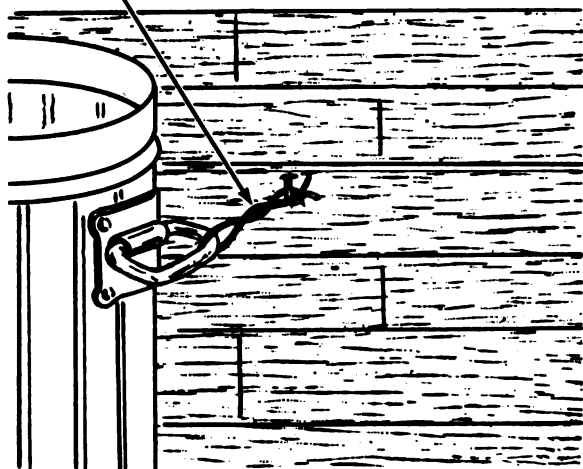


Figure 38. 32-gallon galvanized can installed.

boards can float freely on the surface of the water. Each time the splashboards are to be used, they should first be thoroughly scrubbed in a hot soapy solution and then rinsed with clear, hot water. When water is added to or taken from the cans, splashboards must be handled carefully so

that they are not allowed to touch the car walls or floor or other surfaces that may be dirty.

d. *Metal Pails.* Fill required number of pails with sand and place them in the car as shown in figure 33 or figure 34, whichever is appropriate. Place remaining pails at ends of cook's worktables for use as containers for waste resulting from food preparation.

e. *Gasoline Cans.* Gasoline must be stored in either military type or safety type 5-gallon gasoline cans. Gasoline cans, whether filled or empty, must at all times have filler plugs screwed securely into openings and must be braced in a fixed position. The type of box shown in figure 40 for transporting military water cans may be adapted for use with military or safety gasoline cans.

- (1) *Container installation.* Locate boxes as far away from the ranges as practicable. Desirable locations are shown in figures 33 and 34. Secure boxes to the car floor with screws. Check all cans to make sure that all filler-caps are secure and that gasoline does not leak. Place cans in box compartments and close lid on box.

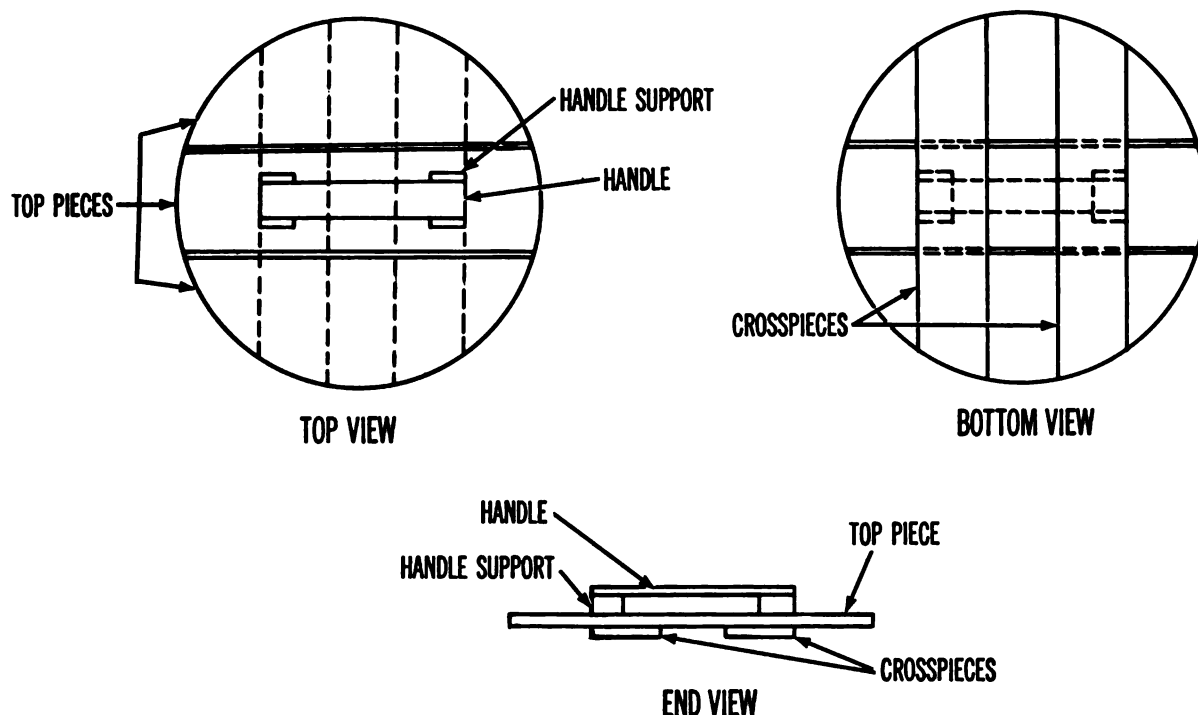


Figure 39. Splashboard, construction details.

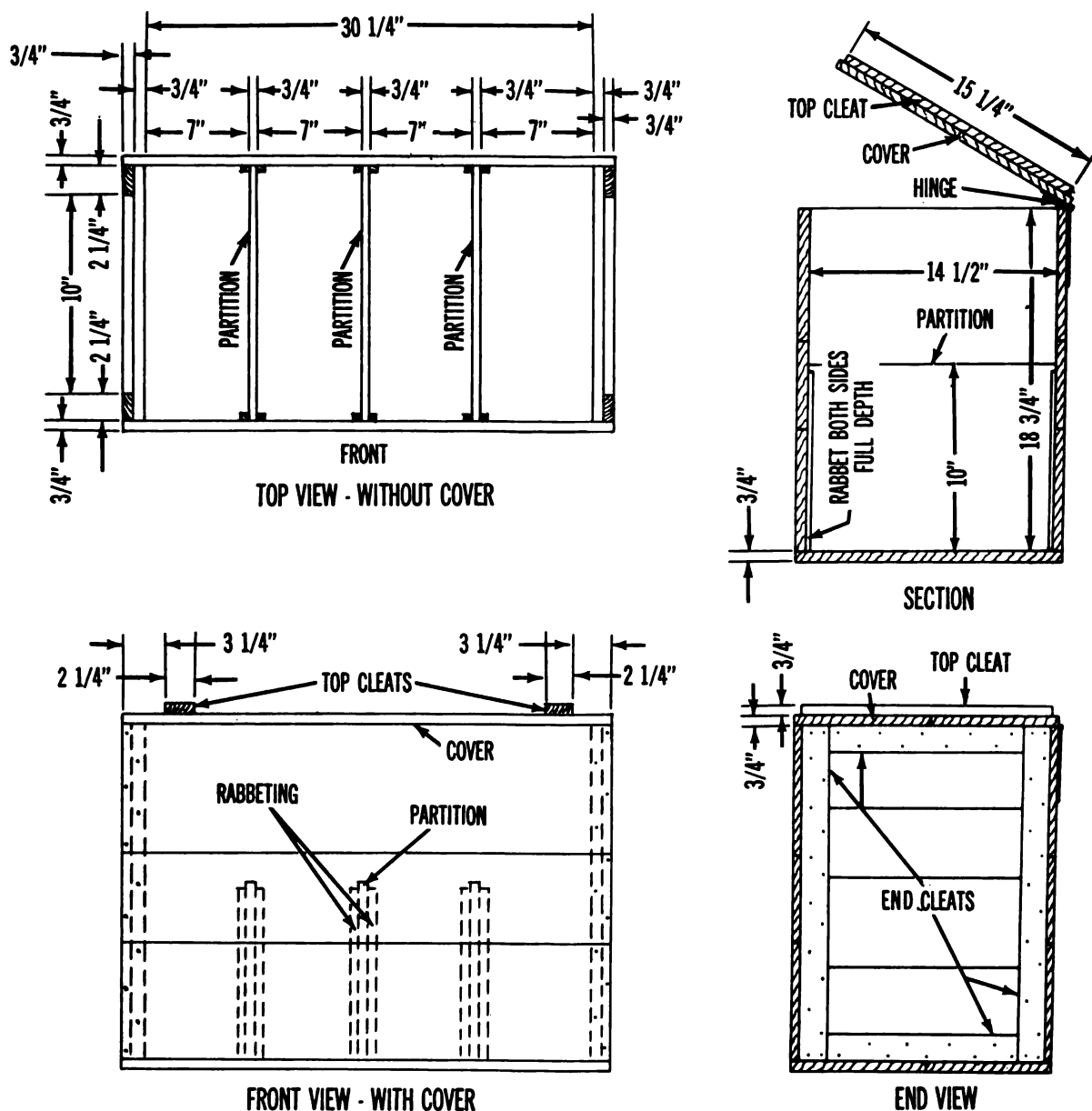


Figure 40. Box for transporting military water cans, construction details.

- (2) *Reserve supply.* If troop train cars are mixed, a reserve supply of gasoline may be carried in the boxcar nearest the kitchen baggage car. This supply must be stored in boxes which have been screwed securely to the floor of the boxcar. Care must be taken to see that other material in the boxcar does not fall on or slide against the boxes containing the gasoline cans.

f. Insulated Food Containers. Insulated food containers should be placed in a row against the right sidewall of the car, in the storage area.

g. Military Water Cans. Whether or not the 5-gallon military water cans are to be returned to the installation of origin from the troop movement destination, the cans should be transported in boxes of the type shown in figure 40. Cans must be filled before the journey begins and may be refilled while in the boxes. Cans should remain in the boxes when not in use. Can lids must be secured when the cans are not being filled or emptied. It is not necessary to screw the water can boxes to the car floor.

h. Fire Extinguishers. Fire extinguishers should be mounted on wall brackets and placed

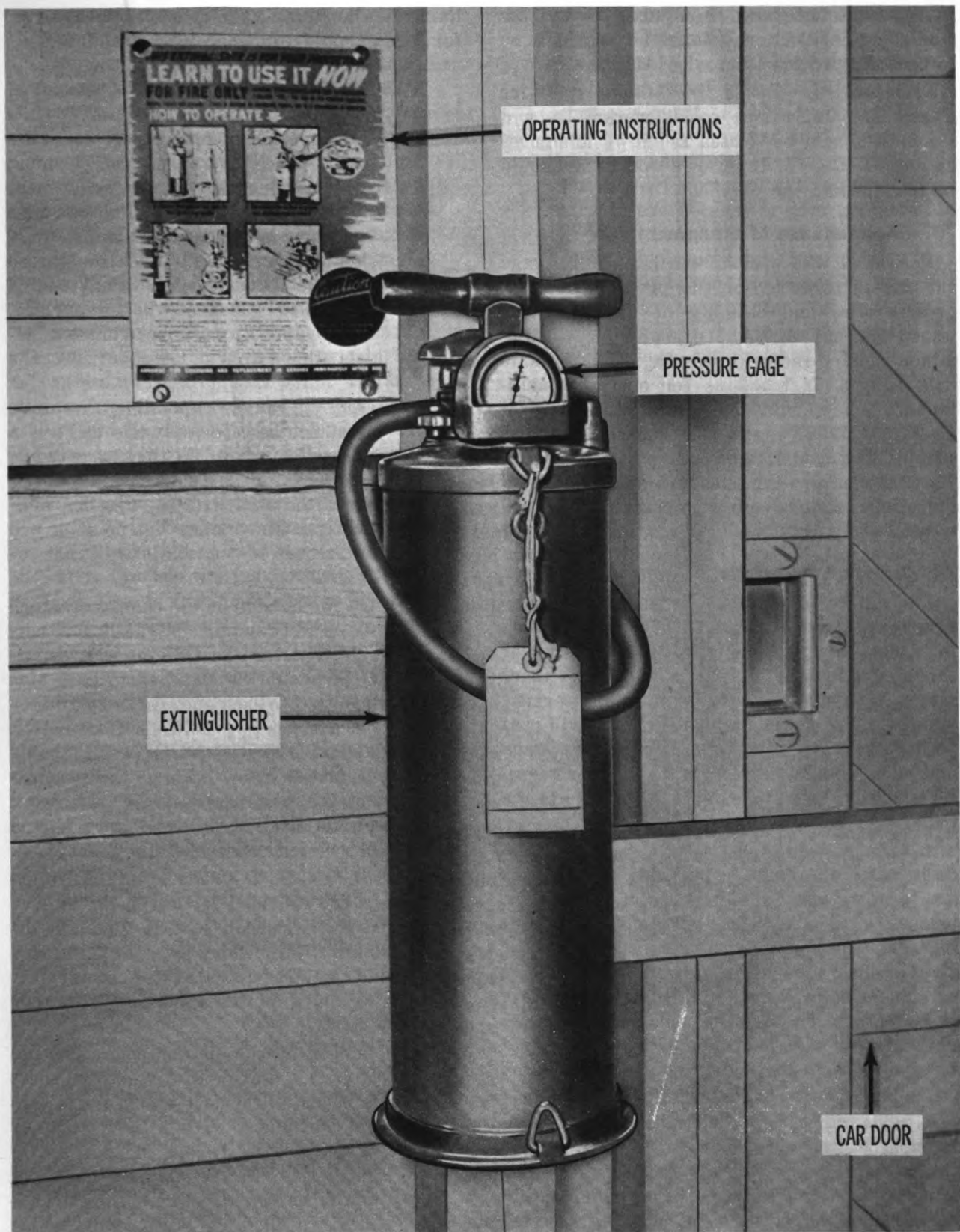


Figure 41. Fire extinguisher mounted on right sidewall of car.

in the locations shown in figures 33 and 34. Operating instructions should be posted close to each fire extinguisher (fig. 41).

i. Improvised Cook's Worktables and Ice Chest. The improvised cook's worktables and ice chest should be located as shown in figures 33 and 34. Legs of the cook's worktable should be toenailed to the car floor.

73. Maintenance of Equipment

Personnel who operate the kitchen baggage car are responsible for the proper care, use, preservation, and cleaning of all equipment issued for use with the car and for making minor repairs and adjustments to the gasoline field ranges. Instructions for operator maintenance of the field ranges are contained in TM 10-701 (M1937) and TM 10-7360-204-12 (M59). The field range accessory outfit (para. 71a(2)) contains the tools and repair parts required for making minor repairs and adjustments.

74. Safety Precautions

The safety precautions listed in this paragraph are considered to be adequate in most instances. However, the troop train commander should familiarize himself with all pertinent safety regulations of the Army, the carrier, and the areas through which the train will pass while troops are in transit. Usually, this information can be obtained from the railway representative or the train conductor assigned to the train.

a. Construction of Doorway Crosspieces. Because ventilation must be provided when ranges are in operation, the side doors of the kitchen baggage car are kept open. The side door openings must be barred with crosspieces, made of 2- by 4-inch lumber, to prevent personnel or equipment from falling from the train while it is in motion. The ends of the crosspieces are nailed to the car. The upper crosspiece should be about 4 feet above the car floor; the lower crosspiece, about 2 feet above the floor.

b. Prohibition of Smoking. Smoking in kitchen baggage cars is prohibited. Not only is this necessary as a sanitary measure, as in all kitchens, but the presence of gasoline in the car makes the prohibition of smoking a necessary safety precaution.

c. Use of Immersion Heaters. The use of

immersion heaters in the kitchen baggage car, for any purpose whatsoever, is prohibited.

d. Use of Gasoline.

(1) Gasoline should not be transferred from one container to another while the containers are on or near the train. A commissioned officer must supervise the removal or replacement of gasoline and the refueling of range fire units. When practicable, fire units should be refueled outside the car so that the dangerous condition created by spilled gasoline will be avoided. If fire units must be refueled inside the kitchen baggage car, the fire units should be refueled as far from the ranges as possible. Fire units must not be refueled while there is a flame of any kind in the car or while the car is in motion. A flexible nozzle should be used with the 5-gallon military gasoline can so that pouring will be easier and gasoline will not be spilled.

(2) On the outside of the boxcar in which the reserve supply of gasoline is carried, a placard bearing the word DANGER should be attached to each side door and to each end. An 8- by 10-inch placard reading EXTRA GASOLINE FOR COOKING PURPOSES should be placed below each of the placards on the side doors; and the word FLAMMABLE, in red letters, should be printed on each of these cards.

e. Use of Fire Extinguishers. Three fire extinguishers are provided for use in the kitchen baggage car: the carbon dioxide type and the foam type fire extinguishers listed in paragraph 71a(7) and the hand-operated fire extinguisher which is included in the gasoline field range accessory outfit.

(1) *Carbon dioxide extinguisher.* The use of carbon dioxide in fire extinguishers is based on the fact that a flame cannot continue to burn without a supply of oxygen. A carbon dioxide extinguisher is effective because its vapor discharge stream, when properly applied to flaming areas, will isolate these areas from surrounding air and suffocate the flames. Although this

type of extinguisher is most effective in inclosed areas where the supply of oxygen is limited, it is in inclosed areas that the use of the extinguisher is most dangerous to personnel. For this reason, kitchen cars should be ventilated immediately following a fire. Each extinguisher is equipped with a pressure-relief type safety disk. Carbon dioxide expands when heated and, if its temperature becomes high enough, will build up sufficient pressure to burst its container. The safety disk breaks and releases the carbon dioxide vapor before the pressure within the container reaches this point. The discharge stream of the extinguisher should be directed at the base of the fire and moved at a moderate speed across the entire flaming area. Vapor is wasted if the stream is moved too rapidly or too slowly. The extinguisher horn must not be held above the hand-grip, because the temperature of carbon dioxide vapor is far below freezing and the hand may become frozen to the horn. Carbon dioxide extinguishers should be located away from heated areas and from the direct rays of the sun.

- (2) *Foam extinguisher.* The foam extinguisher is filled with chemical solutions. When the extinguisher is inverted, the solutions mix to produce carbon dioxide gas in the form of foam. Carbon dioxide in this state is particularly effective when used to extinguish fires that develop in liquids or grease. The foam stream should not be directed onto burning surfaces because the bubbles in the foam will burst on contact with hot solids. It should be applied as gently as practicable and spread over the area immediately above the burning material to cover as much of the area as possible. Because continued presence of carbon dioxide vapor in inclosed areas can be harmful to personnel, the car must be ventilated as soon as the fire has been extinguished.

- (3) *Extinguisher in field range accessory*

outfit. Either a 2½-pound dry chemical fire extinguisher or a 2¾-pound monobromotrifluoromethane fire extinguisher is issued with the field range accessory outfit. Either type can be used to extinguish fires in flammable liquids or electrical equipment; however, the dry chemical extinguisher is safer to use because it does not give off toxic fumes as does the monobromotrifluoromethane type. Persons who use the latter type should be careful not to breathe the fumes and should ventilate the car as soon as the fire has been extinguished.

75. Packing Equipment for Return Shipment

When return of kitchen baggage car equipment to the installation of origin is required, the installation engineer at the troop movement destination is responsible for packing the equipment in the containers provided by the installation of origin. Following is some information regarding the packing of equipment for return shipment.

a. Field Ranges and Accessory Outfit. Instructions for packaging the various components of the field range and accessory outfit are contained in TM 10-701 or TM 10-7360-204-12. Gasoline must be drained from the fire or burner unit fuel tanks before the units are shipped.

b. Gasoline Cans. Gasoline cans may be returned to the installation of origin in the boxes in which the cans were transported. Military and safety gasoline cans should be drained and ventilated before they are packed for shipment. When the boxes are removed from the train, the screws used to secure the boxes to the floor (para. 72e), or substitute screws of the same size, should be placed in a cloth bag or envelope and tacked to the inside of the box. The tube with flexible nozzle used with the 5-gallon military gasoline cans must be air-dried and wrapped in paper. Wrapping must cover the tube completely and must be of sufficient thickness to enable the tube to fit snugly in the box, across the top of the cans. The wrapping and snug fit are necessary to prevent sparks that might result if the exposed surface of the tube should come in contact with the metal surfaces of the cans.

c. *Water Cans.* Water cans may be returned to the installation of origin in the boxes in which the cans were transported. All cans should be drained and air-dried before they are packed.

d. *Fire Extinguishers.* The dry chemical or monobromotrifluoromethane extinguisher is packed with the other components of the field range accessory outfit as described in TM 10-701 or TM 10-7360-204-12. The carbon

dioxide type extinguisher and the foam type extinguisher should be shipped together. If the foam type extinguisher has been used en route, it must be emptied and flushed with clear water before it is shipped. The carbon dioxide type extinguisher may be shipped partly filled if necessary. Remove the horn and hose from each extinguisher and pack them in the compartment with the extinguisher from which they were removed.

Section IV. ISSUE AND TURN-IN OF SUBSISTENCE AND RELATED SUPPLIES

76. Disposition of Subsistence Prior to Troop Movement

When units or organizations are directed to change stations, all subsistence items on hand must be turned in or disposed of. All unopened articles of subsistence that are fit for reissue are turned in to the commissary officer on DA Form 3161. Items which have been opened but are fit for consumption are disposed of as directed by the installation food adviser. Items unfit for reissue or human consumption are disposed of as refuse.

77. Initial Issue of Subsistence for Troop Train Movement

a. *General.* The commissary officer is responsible for issue of the troop train ration for enlisted personnel directed to travel by troop train movement. Officers and warrant officers who are in charge of troop movements or who are traveling with the troops may be subsisted en route if they pay for their meals, either by cash reimbursement or, if the commanding officer approves, through pay order deduction. Railroad operating crews and pullman crews may also be subsisted on a cash reimbursement basis.

b. *Menus.* Usually, the meals served on a troop train are based on the menus contained in SB 10-540. However, if the major commander so directs, operational rations (para. 79) may be served instead. If it is impracticable for mess personnel to prepare the first meal, box lunches may be served.

c. *Value of Ration.* The cost of the troop train may not exceed the current money value limitation of the field ration A. The method of deter-

mining the cost of the troop train ration is discussed in AR 31-200.

d. *Quantities Issued.* One ration for each person for each day's normal travel time is issued. One additional meal or nonperishable subsistence (preferably the meal, combat, individual) is issued for each man for each full day scheduled for troop movement. The additional allowance, which may not exceed one full ration (three meals), is to be used only in the event of a delay and may not be used to supplement the regular menu. The initial supply of bread and milk may not exceed the amount required for the first six meals.

e. *Procedures.*

- (1) If railroad employees are to be subsisted and the number of such persons is known beforehand, the train commander writes the number of meals required on the copy of the troop movement order presented to the commissary officer.
- (2) When the commissary officer receives the troop movement order, he prepares DD Form 482 (Request for Troop Train Ration) (fig. 42), as prescribed in AR 31-200. The train commander is given a copy of this form and signs the copy retained by the commissary officer.
- (3) DA Form 10-260 listing the components of the menus in SB 10-540 and the authorized allowances, is prepared by commissary personnel. The ration cycle will depend on the first to be consumed. Emergency rations are listed on a separate issue slip. If

REQUEST FOR TROOP TRAIN RATION		DATE	
UNIT <u>Train Commander</u> <u>Train Main No. 4748</u>		22 October 19--	
PROCEEDING PER PARAGRAPH NUMBER <u>47</u>		INSTALLATION <u>Fort Blank, California</u>	
DATED <u>16 October 19--</u>		SPECIAL ORDER NUMBER <u>95</u>	
RATION DATE FROM: <u>Supper 24 October 19--</u>		HEADQUARTERS <u>XX Infantry Division</u> <u>Fort Blank, California</u>	
THRU: <u>Breakfast 28 October 19--</u>			
NUMBER OF RATIONS REQUIRED			
DAY	TOTAL RATIONS	BREAKFAST	DINNER
1st Day	<u>45</u>	<u>0</u>	<u>0</u>
2nd Day	<u>173</u>	<u>173</u>	<u>173</u>
3rd Day	<u>173</u>	<u>173</u>	<u>173</u>
4th Day	<u>173</u>	<u>173</u>	<u>173</u>
5th Day	<u>61</u>	<u>173</u>	<u>0</u>
6th Day			
7th Day			
ADDITIONAL RATIONS (Delay en Route)	<u>173</u>		
TOTAL RATIONS DUE	<u>798</u>		
SIGNATURE OF TRAIN COMMANDER <i>John H. Stephens</i>		GRADE <u>Captain</u>	TROOP TRAIN MAIN NUMBER <u>4748</u>

DD FORM 482 1 MAY 51
REPLACES WD AGO FORM R-5288, 17 JAN 46, WHICH IS OBSOLETE
U.S. GOVERNMENT PRINTING OFFICE: 1951 O - 94392

Figure 42. Completed DD Form 482 (Request for Troop Train Ration).

a box lunch is to be served as the first meal, the ingredients are listed on a third issue slip.

- (4) The commissary officer also prepares one copy of DD Form 483 (Troop Train Ration Issue and Purchase Record), completes the first entry thereon, and gives the form to the train commander, along with a copy of each of the field ration issue slips. The commissary officer also gives the train commander information copies of the menus on which the issue is based and a copy of the current price list.

78. Issue of Ice, Fuel, and Accessory Items

a. *Ice.* The commissary officer must see that enough ice is provided kitchen cars to properly refrigerate the perishable items in the troop train ration. Ice is issued on DD Form 388 (Ice Issue Slip), which is prepared and kept by the commissary office. The cost of ice is not included in the cost of the troop train ration.

b. Fuel.

- (1) *Gasoline.* Gasoline needed for operation of the field ranges in the kitchen baggage car must be drawn from the consolidated supply officer on DA Form 2765 or 2765-1. Gasoline should be drawn in sufficient quantity to last the entire journey, on the basis of 5 gallons per range per day for each of the days the kitchen car is to be used. However, if the trip is of sufficient length to require storage of fuel in excessive amounts, gasoline may be obtained en route at an emergency supply point.
- (2) *Coal.* Coal needed for operation of the ranges in the troop kitchen car must be requisitioned from the engineer at the installation of origin on DA Form 2765 or 2765-1. Car coal storage receptacles and feeder chutes, where present, must be filled to capacity before the troop train departs.

c. *Accessory Items.* Accessory items, such as

TROOP TRAIN RATION ISSUE AND PURCHASE RECORD				
SECTION I - TROOP TRAIN RATION ISSUES				
DATE	TRAIN MAIN NO.	INSTALLATION	VALUE OF ISSUE	SIGNATURE OF COMMISSARY OFFICER OR AUTHORIZED REPRESENTATIVE
24 Oct 19--	4748	Fort Blank, California	1,088.69	Robert B. Sales, Capt, OMC
26 Oct 19--	4748	Blank AFB, Utah	27.00	Amos D. Rowe Capt USAF
TOTAL VALUE OF ISSUES			\$ 1,115.69	
SECTION II - ITEMS AUTHORIZED FOR ISSUE OR PURCHASE ENROUTE				
ITEM		QUANTITY	ITEM	QUANTITY
Milk		346 - $\frac{1}{2}$ pts.		
Bread		104 lbs.		
Ice		200 lbs.		
ESTIMATED TOTAL VALUE OF ITEMS TO BE PURCHASED ENROUTE			\$ 27.00	
SECTION III - FUNDS FOR PURCHASE OF SUBSISTENCE ENROUTE				
DATE	VOUCHER NUMBER	INSTALLATION	FUNDS FOR PURCHASE	SIGNATURE OF FINANCE AND ACCOUNTING OFFICER
			ADVANCED	
			\$	
			RETURNED	
			\$	
NET VALUE OF PURCHASES			\$	

DD FORM 483
FEB 61

CONTINUED ON REVERSE SIDE
PREVIOUS EDITION OF THIS FORM IS OBSOLETE.

Figure 43. DD Form 483 (Troop Train Ration Issue and Purchase Record) showing entries made by commissary officers at point or origin and emergency supply point.

plastic forks and spoons, glassine bags, and paper cups, plates, napkins, and lunch boxes, when required, are issued by the consolidated supply officer. The cost of these supplies is not included in the cost of the troop train ration.

79. Use of Operational Rations

If operational rations are substituted for the troop train ration (para. 77b), the commissary officer should see that a different menu is provided for each full day of travel. To prevent the accumulation of incomplete rations, the train commander must make sure that operational rations are opened only as needed.

80. Supplemental Issues En Route

If additional subsistence supplies are required because of a delay or if resupply of ice, bread, milk, or fuel is required, issues are obtained from emergency supply points (AR 55-125). Issues are processed in the same manner as the issues made at the point of origin. The commissary officer at the emergency supply point records the money value of the subsistence supplies on the next available line in section I, DD Form 483 (fig. 43), as prescribed in AR 31-200.

81. Turn-In of Supplies at Destination

a. Normal Procedure. When the troop train arrives at its destination or when a kitchen car

is discontinued en route, the train commander turns in all subsistence supplies on hand (whether or not the containers have been opened) to the commissary officer or his designated representative. The commissary officer lists all items turned in on DA Form 3161, computes the value of the items for which the train commander will be given credit, and gives the train commander a copy of the form for inclusion as a credit voucher in the troop train subsistence account. Incomplete operational rations are not credited to the account. Paper and wood supplies are turned in to the consolidated supply officer.

b. Exceptions.

- (1) If the final destination of the troop train is a maneuver area where subsistence supplies are not being accounted for under a formal monetary accounting system, the supplies are turned in as directed by the maneuver area commander.
- (2) If the final destination or point of discontinuance is at an installation not having a commissary, the installation commander designates a representative to meet the troop train and to receive and receipt for the supplies. Otherwise, ration turn-in is as described in *a* above.

Section V. ACCOUNTING PROCEDURES

82. Cash Collections for Meals

a. Cash collections made for meals furnished personnel not authorized to subsist at government expense, including railroad and pullman crews, are based on the current rates for meals served in messes operating under the field ration system. Surcharges are not collected. Personnel who pay cash for their meals must sign DA Form 1544. Provisions for the issue of individual cash meal payment sheets for use on troop trains are contained in AR 30-41. The number of officers and train crew members fed is entered after each meal in the appropriate spaces in section I, DA Form 2389 (Troop Train Ration Account) (fig. 44). After the last meal, the total amount of cash collected for meals is entered in the appropriate space in section II, DA Form 2389.

b. The cash collected for meals and the cash meal payment sheet must be turned in to the finance officer at the troop movement destination on DD Form 1131. The train commander must obtain a receipted copy of this form to support the entry made on DA Form 2389.

83. Troop Train Ration Account

DA Form 2389 (fig. 44) is the record maintained by the troop train commander to account for all of the subsistence supplies used for the troop movement. The commissary officer at the installation of origin completes the heading and column *b* (meal value) of section I. The troop train commander completes the remainder of the form.

a. Section I. The headcount is entered after each meal. After the last meal has been served,

TROOP TRAIN RATION ACCOUNT (TM 10-304)																		TRAIN MAIN NUMBER 4748			
INSTALLATION OF ORIGIN Fort Blank, California									DATE AND TIME OF DEPARTURE 24 Oct 19--, 1500 hrs									FIRST MEAL SERVED Supper			
INSTALLATION OF DESTINATION Fort Indian, Wyoming									DATE AND TIME OF ARRIVAL 28 Oct 19--, 1000 hrs									LAST MEAL SERVED Breakfast			
SECTION I - SCHEDULE OF MEALS SERVED																					
M E A L	DATE 24 Oct			DATE 25 Oct			DATE 26 Oct			DATE 27 Oct			DATE 28 Oct			DATE			TOTAL MEALS a	MEAL VALUE b	MEAL ALLOW- ANCE (a x b) c
	EM	OFF	CIV	EM	OFF	CIV	EM	OFF	CIV	EM	OFF	CIV	EM	OFF	CIV	EM	OFF	CIV			
BREAK- FAST	0	0	0	170	3	0	170	3	0	170	3	0	170	3	0				692	.300	207.60
DIN- NER	0	0	0	170	3	0	170	3	0	170	3	0	0	0	0				519	.450	233.55
SUP- PER	170	3	0	170	3	0	170	3	0	170	3	0	0	0	0				692	.404	279.57
SECTION II - RATION AND MEAL ACCOUNT																					
1. AUTHORIZED TROOP TRAIN MEAL ALLOWANCE																		720.72			
2. VALUE OF ISSUES (From Total of Section I, DD Form 483)																		1,115.69			
3. VALUE OF PURCHASES (Total Value of Invoices)																					
4. TOTAL (Line 2 + 3)																		1,115.69			
5. LESS VALUE OF SUPPLIES TURNED IN TO COMMISSARY AT DESTINATION																		398.34			
6. NET VALUE OF SUPPLIES CONSUMED (Line 4 - 5)																		717.35			
7. <input type="checkbox"/> OVER CONSUMPTION (6 - 1 = Over)																					
<input checked="" type="checkbox"/> UNDER CONSUMPTION (1 - 6 = Under)																		3.37			
8. CASH COLLECTED FOR MEALS FROM OFFICERS AND TRAIN CREW MEMBERS																		11.73			
9. VALUE OF MILITARY PAY VOUCHER COLLECTIONS FOR MEALS																					
SECTION III - ITINERARY																					
MAIN NUMBER		NUMBER OF TROOPS		DEPARTED		ARRIVED															
				HOUR	DATE	HOUR	DATE														
4748		170 EM 3 Off		1500	24 Oct	1430	26 Oct														
4748		170 EM 3 Off		1630	26 Oct	1100	28 Oct														
KITCHEN CAR DROPPED AT (Place) Fort Indian, Wyoming						ON (Hour and Date) 1100 hrs, 28 Oct 19--															
DATE 28 Oct 19--		SERVICE NUMBER 0344567		GRADE Captain		SIGNATURE OF MOVEMENT COMMANDER <i>John A. Stephens</i>															

DA FORM 2389
FEB 51

REPLACES DD FORM 33,
WHICH IS OBSOLETE.

A 29270

Figure 44. Complete DA Form 2389 (Troop Train Ration Account).

the train commander completes column *a* (total meals) and multiplies the total number of breakfasts, dinners, and suppers served by the appropriate meal value (col. *b*) to get the meal allowance (col. *c*).

b. Section II.

(1) *Line 1.* The authorized troop train meal allowance is the sum of the entries in column *c* of section I.

(2) *Remaining lines.* Self-explanatory.

c. Section III. If the kitchen car is dropped prior to the completion of the troop movement, the location and time of the drop-off must be entered. Any change in troop strength also

must be shown. The troop train commander signs the form after he has completed all necessary entries.

d. Supporting Documents. A copy of each of the following forms must be attached to DA Form 2389 to support the entries thereon: DA Form 483 (para. 77e(4) and 80), DA Form 3161 (para. 81), and DD Form 1131 (para. 82b.)

e. Disposition of DA Form 2389. The troop train commander turns in DA Form 2389 with its supporting documents to the installation commander at the troop movement destination.

Section VI. SERVING AND SANITATION

84. Location of Kitchen Car in Train

The kitchen car should be located as close to the center of the train as possible. When the car is centrally located, it is easily accessible from all parts of the train. This will help to prevent congestion in the train when the meals are served cafeteria style.

85. Mess Equipment

The use of plastic forks and spoons and paper plates and cups is recommended because these items can be disposed of immediately after the meal and the problems of washing messkits are eliminated. If plastic and paper supplies are not available and it is necessary for the troops to use their messkits, the messkits must be thoroughly washed and rinsed both before and after use. Improvised facilities for washing messkits must be set up in the kitchen car. Since the use of immersion heaters in kitchen cars is prohibited, water must be heated in large containers on the ranges.

86. Serving Methods

Food may be delivered to the cars by food carriers, or it may be served from the kitchen car cafeteria style. Regardless of which method of serving is used, the mess steward should stress the importance of close portion control to all food carriers or servers. Food supplies for troop trains are limited, and there is little likelihood that there will be leftovers to back up the serving line as is the case in the garrison mess.

a. Delivery by Food Carriers. This method is considered to be the more desirable of the two suggested methods because personnel will not be required to leave their seats to be served. Servers, working from the kitchen car, carry the food to the various cars in insulated food containers. For morale purposes, a different car should be served first at each meal.

b. Cafeteria Style. The cafeteria style of serving is recommended for stopovers, when personnel can be fed outside the train. Food can also be served cafeteria style while the train is in motion if a serving line is set up in the kitchen car. Troops are broken down into small groups which pass through the serving line at regular intervals. Usually, it is best to feed personnel by cars, one car at a time. For reasons of morale, the order of feeding should be changed for each meal. Occupants of the car chosen to be served first move through the kitchen car, turn and move back through the kitchen car serving line, receive their food, and return to their seats. If paper and plastic supplies are used, a detail can be appointed to clean up the cars after each meal. However, if messkits are used, the troops must make a second trip through the kitchen car to dispose of their plate waste and wash their messkits.

87. Sanitation

Sanitation is the responsibility of the troop train commander, and he or his representative must make whatever periodic inspections are necessary to insure that the health and welfare of the troops in the movement are protected

a. In Kitchen Car. The kitchen car and its equipment must be kept in a clean and sanitary condition. The sanitation practices of the garrison mess should be followed as closely as possible. If food is believed to be unfit for human consumption, a medical officer, if one is available, should inspect the food and determine what disposition should be made of it. In the absence of a medical officer, the mess officer may perform this duty.

b. In Passenger Cars. Details should be appointed to clean up the cups and plates, waste

paper, and other trash that will accumulate quickly in cars in which troops are fed. These details should police the cars after each meal and as often as is necessary to keep the cars clean and neat in appearance.

c. Garbage Disposal. The train commander or mess officer must make arrangements through the train commander to have trash and garbage containers put off the train at suitable points as designated by the railroad. Garbage and trash must not be dumped along the way. See TM 55-601.

CHAPTER 5

DESERT, TROPICAL, AND ARCTIC FEEDING

Section I. DESERT FEEDING

88. Water

a. General. Man cannot long survive if his daily water intake is not equal to the amount of water his body loses through sweat. Because the very high daytime temperatures and the low humidity in the desert create an increased demand for drinking water, an inadequate water supply is a critical factor in desert operations. Local water sources are few; subsoil water may be present in limited quantities, but there is little or no surface water. Even when local water is available, it is usually polluted and often contains excessive amounts of harmful mineral salts. The filtering and sterilization of the water will not always make it safe for drinking. At best, the water is disagreeable to the taste. For these reasons, the water for military personnel must be transported from sources outside the desert and stored in authorized tanks and containers. Soldiers must be trained in the practice of water discipline.

b. Body Requirements.

- (1) The body cannot be conditioned to require less water than is lost by sweating. Water requirements vary according to a man's physical activity, the type of rations he consumes, and the environmental temperature. For example, a man physically active at hard work for 8 hours a day in a daily mean temperature of 120° F. requires approximately 25 quarts of water per day; if the temperature is 100° F., the same man will require approximately 15 quarts per day; and if the temperature is 60° F., he will require only about 3.5 quarts.

- (2) Salt is lost with sweat; and, like water, the salt lost in sweat must be replaced by an equal amount if man is to survive in the desert. Salt must be added to drinking water. The following amounts of salt are recommended:

- (a) Two 10-grain salt tablets or $\frac{1}{4}$ teaspoon per canteen.
- (b) One and a third level messkit spoons per 5-gallon water can.
- (c) Nine level messkit spoons per 36-gallon water-sterilizing bag.
- (d) One level canteen cup per 250-gallon water trailer.

c. Transportation. Water for occupants of a vehicle is carried in 5-gallon water cans. Each vehicle should be equipped with a funnel which fits inside the neck of a canteen so that water will not be spilled when canteens are filled. Water reserves can be carried in water trailers.

d. Use of Water-Sterilizing Bags. Water-sterilizing bags may be used at installations which operate evaporators, where water is sufficiently plentiful not to require the use of stringent conservation measures. Drinking water is more palatable when kept in these bags, as the bags are suspended in the open for free air circulation around the bag surfaces. Evaporation of the water from the bag surfaces will cool the water on the inside even when temperatures are very high.

89. Food

a. Supply. Local food supplies must not be used for personnel engaged in desert operations. Standard field and operational rations suitable for the nourishment of military per-

sonnel under desert combat conditions should be packed so that they can be quickly broken down for issue to individuals or small groups. Rations should be of a type that can be prepared individually with little water. Patrols and other small operational groups should be furnished small gasoline stoves on which to prepare their meals and sufficient rations to last for the anticipated duration of the particular operation, plus a reserve based on the amount of time the group will be away from supply sources.

b. Feeding in Transit. Each vehicle must carry food for the occupants of the vehicle; meals must be prepared by individuals or by the group assigned to the vehicle for this purpose, depending on whether the rations are individual or multiple rations. The ranges or stoves (app. C) necessary to prepare the food should be carried by each vehicle.

c. Preparation.

- (1) *In rear areas.* When food is prepared in a unit mess, condiments that provoke thirst should not be used. Food that can be heated in the liquid in which it is packed should be used whenever possible, because any water that is used for cooking must be taken from individual water rations. If foods must be cooked in water, the cooking liquids that result should be served as a part of the meal.
- (2) *In forward areas.* In forward areas, individuals or small groups prepare

their own meals. The rations issued should be in cans so that the troops can heat them in water from their canteens. The water can then be used to prepare coffee, tea, or other beverages. Soluble coffee, tea, or fruit concentrates can be used to flavor purified water that is disagreeable to the taste.

90. Sanitation

Proper mess sanitation can do much to lessen the incidence of intestinal diseases among troops employed in desert operations. During the preparation of meals, all foods must be covered for protection from dust and flies or other insects. Because water for washing mess equipment and utensils is scarce, as few items as possible should be used in meal preparation. Whenever possible, food should be prepared in the cans in which it is packed. Following each meal, cans should be buried in the sand and camouflaged as necessary to prevent observation from the air. Germicidal rinses should be used for washing mess gear and utensils when water is scarce or when water is available but cannot be properly heated because of the nearness of the enemy. In rear areas, solid wastes should be burned when the situation permits. Soakage pits should be used to dispose of liquid wastes and should be mounded over with 2 feet of soil when the troops leave the area.

Section II. TROPICAL FEEDING

91. Water

Water may or may not be plentiful in tropical areas. In jungle areas, the inaccessibility of water may prevent its use during an active combat phase. Surface water may be purified by chemical agents or by boiling until such time as the engineers provide adequate supplies of pure water. The information given in paragraph 88*b* regarding the body's need for water applies to tropical areas as well as to desert areas.

92. Food

a. Types Used. No special foods are required in the diet of persons engaged in operations in

the tropics, and quantities available for issue are the same as those authorized in normal feeding situations. Light foods, such as fruits and vegetables, and liquids, such as cold beverages and fruit juices, are usually preferred by the soldier who is fighting in hot, humid climates. The proportion of these items over heavier foods, such as meats and starches, may be increased as long as the diet remains in balance. Maintenance of regular supply channels in tropical areas is difficult, and fresh foods deteriorate rapidly in the heat and humidity of these regions. For these reasons, rations used in the tropics consist chiefly of nonperishable foods, even in semipermanent installations and

under stable tactical conditions. For men on the march, most food should be ready to eat without cooking. All food carried should be highly nutritious but light in weight. Dried and dehydrated foods meet these requirements. If water and the equipment needed for heating the water are available, these foods can be easily reconstituted. However, all water used for reconstitution must first be purified. Typical dehydrated foods issued in jungle areas are dried cooked meats, canned breads, powdered milk, oatmeal, rice, soluble coffee, cocoa, dried fruits, and vegetables. Two pounds of such foods per man per day will sustain troops during the most vigorous activity.

b. Storage.

(1) *Nonperishables.* Nonperishables should be stored in the following manner:

(a) Canned goods should be protected from the deteriorating effects of moisture and should always be covered while in storage. Canned goods should be stored in shacks, tents, or other inclosed spaces. If no inclosed storage space is available, canned goods can be stacked in the open on pallets or dunnage and covered with tarpaulins. In an emergency, dunnage can be built with the trunks of small trees, with branches removed. The highest point in the area should be selected for open storage; ditches should be dug, if necessary, to carry off any surface water in the storage area.

(b) Other nonperishables, such as dry goods received in bags or other paper containers, should be stored in airtight metal containers for protection from mildew, mustiness, and other forms of spoilage that results from exposure to moisture.

(2) *Perishables.* Mechanically driven field refrigeration equipment is required for the storage of perishables. Since outside power sources are not usually available, the refrigerators must be of the self-contained walk-in or chest type, according to the amount of storage space required. Either type can be transported in a general-purpose truck and operated during transit. Each type generates power for opera-

tion of its refrigeration unit by means of a gasoline engine, which is a part of the refrigerator power unit. The 150-cubic-foot portable walk-in refrigerator will refrigerate sufficient perishables to supply the needs of 300 to 450 men, depending on the type of food stored and the weekly ration issue frequency. The 25-cubic-foot portable chest-type refrigerator is used to refrigerate perishables for smaller groups of men located in isolated areas. All open food containers must be kept screened or covered to protect the food from contamination by insects. A suspended screen box can be used for storing some perishables for a short period of time. Because of marshy ground and frequent rainfall, underground storage is seldom possible in tropical areas.

c. Preparation and Serving. At semipermanent installations, screened framework should be built to inclose both the preparation area and the messing area. Food for small reconnaissance or security detachments should be supplied from unit messes and transported in inserts from insulated cans. When units must march along narrow trails, the ration should be distributed so that meals can be prepared by squads or by individuals. Field bread should be baked with a hard crust and in small loaves to facilitate handling and to prevent damage when transported by pack.

93. Sanitation

Sanitation in jungle messing is a serious problem, because the heat and humidity provide ideal conditions for the development of bacteria in food. A constant effort must be made to protect food from insects. Sanitation measures established by FM 21-10 must be rigidly observed. Garbage and other organic wastes ferment rapidly in tropical climates and should never be allowed to stand in messing areas, even for a short period of time. Waste should be disposed of after each meal, preferably by burning. If, for security or other reasons, the waste cannot be burned, it should be buried at least 2 feet below the surface of the ground. The fill should be mixed with tin cans and covered with logs or stones to prevent animals from digging up the waste and creating a health hazard.

Section III. ARCTIC FEEDING

94. Water

a. The supply of water in the arctic may be a serious problem until water supply points have been established. Troops should receive 2 quarts of water per day in beverages to insure adequate water intake; and if sweating occurs because of physical activity and heavy clothing, the water requirement increases proportionately.

b. During the colder periods of the year, strict conservation of water must be practiced. Free-flowing water may be present under the ice on lakes; but when temperatures are extremely low, it may not be possible to pump this water to the messing area because the water may freeze in the transmission lines before it reaches its destination. Although the ground may be covered with snow, a large amount of fuel is required to melt enough snow to produce a small amount of water. This places a burden on available fuel supplies, which are needed for cooking and heating.

c. When the water supply for the mess must be obtained by melting ice or snow, at least one man should be detailed to the task on a full-time basis. Ice and snow can be melted in containers on kitchen ranges, in small cans on space-heating stoves or over open fires (when firewood is available), or in corrugated cans with immersion heaters. So that the bottom of the container will not be burned out, a small amount of snow should be placed in the container and allowed to melt; then larger amounts may be added slowly.

d. Before the water obtained by melting snow or ice is used, it must be disinfected by adding chemical agents provided by regular supply channels.

e. The water supply for men on the march should be carried in vacuum containers, because the arctic temperature will cause the water carried in canteens to freeze. Snow should not be eaten because of the possibility of damage to the mouth by frostbite.

95. Nutrition

a. *Nutritional Requirements of the Body.* Studies at the U.S. Army Medical Research and Nutrition Laboratory have demonstrated that

troops under average conditions of physical activity in the arctic do not need supplemental rations. Troops serving in the arctic require the same single authorized ration and master menu prescribed for all other climates. The only exception to this is when troops are engaged in outdoor activities over periods of 1 week or more and the prevailing temperature is sub-zero. Under this condition the ration for these troops is increased to a minimum of 4,400 calories per day.

b. *Importance of Fats in the Diet.* Fats are of great importance to the arctic diet, but must not necessarily be eaten in large amounts. Although the proportion of fats in the diet is larger in cold climates, other substances must be present in the diet in sufficient amounts to convert fats into energy. The need for these substances makes the maintenance of a balanced diet imperative.

c. *Importance of Vitamin C.* The fresh foods normally used to provide vitamin C for diets in the more temperate climates are difficult to furnish in quantity in the arctic. The relatively small amounts of this vitamin in processed vegetables should be retained as much as possible by proper cooking practices. Heat canned vegetables in the liquor from the can; do not add soda or water and do not overcook. Make use of pot liquor from cooked vegetables in the preparation of soups because vitamin C, being water soluble, dissolves out of the vegetables into the water. In the standard rations issued for use in the arctic, allowances are made for lack of the fresh foods that have a high content of vitamin C. These rations are nutritionally complete.

d. *Emergency Fresh Meat Diets.*

- (1) *Animals.* Man and the lower animals require about the same nutrients for sustenance. In an emergency, man can live indefinitely on a diet composed entirely of fresh meats. This diet will not cause serious nutritional deficiencies if the whole animal, including the blood and visceral organs, is eaten. Reasonably good health can be maintained on a diet of $1\frac{1}{2}$ pounds of organs and muscle meat and $\frac{1}{2}$ pound of fat per day.

- (a) *Prevention of trichinosis.* The meat of carnivorous animals must not be eaten rare because it may be infested with trichinae. Precautions used in the preparation and cooking of such meat should be the same as those observed for pork.
 - (b) *Conservation of vitamins.* Except for ascorbic acid (vitamin C), animals store appreciable quantities of water-soluble vitamins in their muscle tissue. Most meat from the whole animal must be cooked by the moist-heat method. The liquid left in the container in which the meat has been cooked will contain a rich supply of vitamins absorbed from the meat during cooking. The soldier may reclaim these vitamins if he drinks this liquid.
 - (c) *Consumption of polar bear meat.* All flesh of the polar bear, when properly cooked, is safe to eat. However, the liver must not be eaten under any circumstances because its oversupply of vitamin A may prove fatal to the consumer.
- (2) *Fish.* A diet of fresh fish will sustain the soldier for a reasonable length of time if the organs, particularly the liver, are eaten as a supplement to the lean and fat meat of the fish.

96. Meal Planning

a. Food Preferences. The cold weather of the arctic has a marked effect on the food preferences of the troops. Many food items of little popularity in temperate climates are well received in extremely cold climates. Generally, the individual will accept any hot food. All hot beverages are popular in the arctic, but hot tea, a beverage of limited acceptability in messes in other areas of the world, is a favorite. Hot soups, particularly thick soups made with meat and vegetables, are in great demand, as are all types of meat. The mess steward must recognize that these preferences are the natural result of desires created by the environment in which the troops are operating and must make every effort to serve foods that satisfy both the palate and the needs of the body.

b. Caloric Content. Menus must consist of all foods necessary to a balanced diet. Quantities cooked must be large enough to provide each soldier with the minimum number of calories prescribed by medical authorities for the particular area and the particular time of the year. Emphasis should be placed on the caloric content of foods selected as substitutes for similar foods listed on the established menu. A table of food equivalents is contained in AR 30-15. Foods that contain the most calories will produce the most heat and should be chosen over foods of lower caloric content.

97. Food Preparation

Supply difficulties are numerous in the arctic, and an established menu is hard to follow. The mess steward frequently must substitute supplies on hand for supplies that fail to arrive on schedule. The mess officer must maintain a close liaison with supply points in order to obtain scheduled subsistence items as soon as they are available. Substitutions cause the same items to be repeated on the menu within short periods of time. To avoid monotony because of lack of variety in food items, the mess steward must use skill and ingenuity in planning several ways for serving each menu item.

a. Frozen Foods. Many of the foods issued to messes will be frozen, and all cooks should be thoroughly trained in their preparation. Preparation of frozen foods in the arctic differs in many respects from preparation of the same foods in temperate zones. For example, it may take as long as 48 hours to thaw frozen meats, with artificial heat, with the heat controlled so that thawing will not be too fast and will be complete in all portions of the particular item.

b. Dehydrated Foods. Cooks must emphasize proper preparation of dehydrated foods. Because of the reduced volume and weight of dehydrated foods and the ease with which they are shipped and stored, many food items are supplied in dehydrated form.

98. Feeding Methods

The method of feeding the troops is determined by the size of the group to be fed and by the distance the group is located from permanent or semipermanent messing facilities. Normally, one of the following methods should be used.

a. *Feeding of Units.* Whenever possible, personnel are fed at unit kitchens. Meals should be served in heated tents or shelters, and troops should not have to sit on the snow. All foods and beverages should be as hot as possible at the exact moment that they are served. Cold mess equipment soon chills food, and provision must be made to preheat this equipment before hot food is placed in it. Cans of boiling water should be placed at the head of the serving line so that the men can dip their individual equipment in the water just before receiving food. It is better to serve each man two small helpings of hot food than to serve him an entire meal and have it cool before he can eat it.

b. *Feeding of Small Detachments.*

- (1) *Troops near kitchen facilities.* When small detachments are located within delivery range of unit mess facilities, food is prepared in the unit kitchen and sent forward by kitchen trucks, trailers, or sleds. When temperatures are extremely cold, these vehicles must be inclosed with protective walls and ceilings. Walls should be provided with windows for necessary ventilation, and ceilings should be provided with vents. Hot meals prepared at the unit kitchen must be kept hot while being transported in the truck, trailer, or sled; or the truck or sled can be provided with organizational and improvised equipment so that meals can be prepared during transit or on arrival of the vehicle at its destination. Tentage carried in the vehicle should be pitched near the vehicle so that troops will be sheltered while eating their meals. If tactical conditions are such that the use of tentage is not practicable, food, in insulated food containers, can be delivered by vehicle to personnel in advanced positions. These containers will keep food at a palatable temperature for more than 12 hours. Whenever the danger of enemy fire makes delivery of food to forward positions extremely dangerous, the number of trips can be decreased if the food to be delivered is quick-frozen. Quick-frozen food can be thawed and warmed over small por-

table stoves or space heaters and used for individual or small-group feedings. Unit messes should quick-freeze foods for patrols and security details that must be fed at hours other than those of normal mess operation. Quick-freezing can also be used to preserve leftovers.

- (2) *Troops away from kitchen facilities.* When detachments are located beyond the delivery range or unit mess facilities, operational rations can be heated and served in the cans in which they are packed. Immersion water heaters can be used to heat water in corrugated cans or other acceptable containers. Once the individual has eaten his ration, he can scour his can with snow and use it as a cup for a hot beverage. If this is done, he can dispose of the can after use and will not have to clean his canteen, which is normally used for this purpose. Crackers, confections, a hot meat component, and a hot beverage make a satisfactory meal for men on the march. Operational rations contain either these items or the ingredients for their preparation.

c. *Feeding of Individuals.* Patrols and other small groups in isolated locations carry and prepare their own rations. Components of these rations should not be subject to freezing and should have high caloric value. Dehydrated pre-cooked soups, fruits, vegetables, and meats are satisfactory; oatmeal, cornmeal, and bacon are ideal. These foods are used to supplement normal issues of packaged operational rations. Vacuum-type containers should be provided for liquids so that the liquids will not freeze. Shelter tents can be pitched, and rations can be prepared on portable stoves for individuals or for small groups of men.

99. Food Storage Problems

There are many food storage problems in the arctic that are not found in other regions. The most important of these is keeping certain foods from freezing. The various types of food should be stored as follows.

a. *Nonperishables.* Freezing will not destroy the food value of canned goods. However, many

canned items lose some of their natural flavor, color, and texture when thawed and are not as palatable. If canned items are high in liquid content, freezing may burst the cans and allow air to enter. This condition is not harmful as long as the contents of the can remain frozen, but rapid deterioration will take place when the food begins to thaw. Whenever possible, canned goods should be stored in heated places. Dry stores and most packaged foods are not harmed by low temperatures and need only to be protected from moisture. Food is not usually issued in glass containers, because the freezing temperatures of the arctic will cause the containers to burst.

b. Perishables.

- (1) *Fresh foods.* Fresh foods such as potatoes, tomatoes, onions, and most leafy vegetables lose palatability and eye appeal when they are allowed to freeze. These items are usually delivered in heated trucks. When they arrive at the mess, they must be moved from the truck to a heated storage area immediately. A case of eggs allowed to remain on the ground for only a few minutes in subzero temperatures will freeze, and the entire contents of the case may be lost. All fresh perishables must be stored in heated areas if they are to remain in good condition during periods of very low temperatures.
- (2) *Frozen foods.* Most perishables issued in the arctic consist of frozen foods. When temperatures are below freezing, the storage of frozen foods is not a problem; the frozen foods can be stacked on dunnage in unheated buildings or tents or kept in improvised facilities in the open. Sudden and extreme temperature changes, however, are not uncommon in the arctic; and some provision should be made for refrigeration. Ice is usually plentiful, and improvised iceboxes may be used. However, if no ice is available, mechanical refrigeration must be provided.

of three types of facilities, depending on the equipment and materials available and the temperature at the time construction is undertaken. These facilities are described below.

a. Underground (Permafrost) Facilities. Because excavation of frozen earth is extremely difficult, underground storage is provided only for large permanent or semipermanent installations. Underground storage is used chiefly for the storage of frozen foods. Pits are dug in the permanently frozen ground, where the temperature is nearly constant throughout the year. Temperatures in these pits vary according to the depth of the pits, because the ground will become warmer as the pits are dug deeper. These pits are sealed with wooden tops, into which access doors are cut. If the proper storage of certain foods requires higher temperatures in these pits, temperatures can easily be raised by artificial means. A single electric light bulb or gasoline lantern can be placed in the pit and allowed to burn constantly. This expedient will usually raise and hold the pit temperature at a few degrees below freezing, the temperature at which foods are stored in the chill room of a large garrison mess.

b. Ration Dugouts. Ration dugouts are generally used for the storage of nonperishables and frozen foods but may be used for the storage of fresh foods if the temperatures are artificially controlled with light bulbs or gasoline lanterns. The ration dugout must be provided with a shed at the dugout entrance to prevent the entrance from becoming blocked with snow during the winter. Dugouts must be constructed in the summer or fall before the ground freezes, because excavation in frozen ground is impossible without drilling and blasting equipment.

c. Open Storage. When heated space is not available canned goods can be stored in the open. Storage areas selected should be on high ground that provides natural drainage. This ground should be ditched before the ground freezes or, if the ground is frozen, ditched as soon as the ground has thawed and is soft enough to be worked. Food articles should be stacked in their original cartons or cases on pallets or dunnage and then covered with tentage or tarpaulins.

100. Food Storage Facilities

Ordinarily, food is stored in one or more

101. Sanitation

a. Cleaning and Care of Utensils. All utensils that have been used for cooking or serving food must be washed in a hot, soapy solution and then rinsed in boiling water. Utensils must be washed immediately after use; if they are allowed to stand in the cold for even a short period of time, grease and food particles may become so hardened that chipping, scraping, and a long period of thawing may be required to remove them. Both the rinse water and the soapy solution can be heated in corrugated cans with immersion heaters.

b. Use of Snow. Because cold will not necessarily kill harmful germs and organisms but may merely keep them inactive, the snow to be melted for drinking or cooking water should be selected with great care. The snow should be taken from areas that are some distance away from garbage disposal and latrine facilities or other places which might tend to infect the snow with human or animal filth. Also, it should be remembered that old snow often contains leaves, dirt, and other trash. After the snow has been melted, the water must be disinfected before it is used.

c. Waste Disposal. If the condition of the ground permits digging, garbage pits and soakage pits can be used for waste disposal. If the ground is frozen hard, garbage and other wastes should be burned. If scarcity of fuel does not permit burning, waste can be buried in the snow at safe distances from the bivouac area. Areas selected for waste disposal should be located so that drainage from them during periods of thawing will not pollute streams or cause contamination of any area where sanitation is required.

102. Fire Prevention

Fire is an ever-present danger in the arctic. Most shelters are made of highly combustible

materials such as wood or canvas; many storage spaces and all living and working spaces are heated. Because large quantities of gasoline for heating and cooking must be stored close at hand, the danger of fire in the arctic is greatly increased; but the ways of fighting fire are greatly reduced. Water may be scarce or, if free-flowing water can be brought to the scene of the fire, it may freeze before it can be used effectively. Since shelter in the arctic is necessary to the preservation of life, the consequences of a fire are much more serious than in warmer climates. Every mess kitchen, no matter how small, must be equipped with at least one fire extinguisher. The extinguisher should be inspected at regular intervals to make sure that it is in operable condition. Mess personnel must be taught how to operate stoves and heaters safely, how to prevent fire in the conduct of all mess operations, and how to fight fire if an outbreak should occur. The mess should be inspected frequently for the presence of fire hazards, and corrective measures should be taken to prevent the use of practices that might cause fire.

103. Prevention of Carbon Monoxide Poisoning

Wherever gasoline is used in inclosed spaces, there is danger of carbon monoxide poisoning. If gasoline is not provided with a sufficient supply of oxygen, it will not burn completely and will emit the deadly fumes that cause carbon monoxide poisoning. Carbon monoxide gas is odorless, and personnel may be overcome before they are aware of its presence. All shelters in which gasoline-fired equipment is used must be provided with adequate ventilation. Vents should be controlled for a slow but steady flow of air. Proper ventilation is especially important in the arctic, because shelters are usually sealed to prevent the entrance of cold air.

APPENDIX A

REFERENCES

AR 30-11	Army Food Program
AR 30-15	Table of Food Equivalents
AR 30-30	Meal Rates for Field and Garrison Ration Messes
AR 30-41	Field Rations and Mess Operations
AR 30-42	Monetary Allowance Ration System
AR 30-46	Subsistence Report and Field Ration Request
AR 31-20	Annual Food Plans, Master Menus, and Menu Boards
AR 31-157	Troop Train and Motor Convoy Subsistence Accounts
AR 31-192	Food Facilities Summary
AR 31-200	Army Commissary Operating Procedures
AR 40-2	Army Medical Treatment Facilities; General Administration
AR 40-5	Preventive Medicine
AR 40-657	Veterinary Food Inspection
AR 55-125	Troop Train Emergency Supply Points
AR 55-355	Military Traffic Management Regulation
AR 115-20	Field Water Supply
AR 310-32	Organization and Equipment Authorization Tables, Personnel
AR 320-5	Dictionary of United States Army Terms
AR 320-50	Authorized Abbreviations and Brevity Codes
AR 385-10	Army Safety Program
AR 385-40	Accident Reporting and Records
AR 420-47	Refuse Collection and Disposal
AR 420-53	Refrigeration
AR 420-55	Food Service and Related Equipment
AR 420-76	Entomology Services
AR 420-90	Fire Prevention and Protection
AR 611-201	Enlisted Military Occupational Specialties
AR 711-16	DSU/Installation Stock Control and Supply Procedures (Army Field Stock Control System)
AR 725-50	Requisitioning, Receipt, and Issue System
AR 735-11	Accounting for Lost, Damaged and Destroyed Property
AR 735-35	Supply Procedure for TOE and TDA Units or Activities
DA Pam 20-551	Staffing Guide for U.S. Army Garrisons
DA Pam 30-1	Army Rations, Food Packets, and Supplements
DA Pam 108-1	Index of Army Films, Transparencies, GTA Charts, and Recordings.
DA Pam 310-series	Military Publications Indexes (as applicable)
FM 5-20	Camouflage, Basic Principles and Field Camouflage
FM 20-15	Pole and Frame Supported Tents
FM 21-5	Military Training Management
FM 21-6	Techniques of Military Instruction
FM 21-10	Military Sanitation

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FM 31-25	Desert Operations
FM 54-2	The Division Support Command
SB 10-260	Master Menu, December 1967
SB 10-495	Standard "B" Ration for the Armed Forces
SB 10-540	Box Lunches and Troop Train and Motor Convoy Menus
TA 50-911	Equipment for Food Service Facilities Serving Field Installations, Troop and Hospital Trains, and Army Vessels
TA 50-986	Allowances of Expendable Supplies to Supplement Equipment for Food Service Facilities Serving Field Installations, Troop and Hospital Trains, and Army Vessels
TB MED 175	The Etiology, Prevention, Diagnosis and Treatment of Adverse Effects of Heat
TM 5-637	Inspection and Preventive Maintenance Services for Kitchen Equipment
TM 5-640	Ranges, Bake Ovens, and Burners for Mess Equipment; Repairs and Utilities
TM 5-700	Field Water Supply
TM 8-501	Nutrition
✓ TM 8-525	Sanitary Food Service
TM 10-210	Inspection and Storage of Subsistence Supplies
TM 10-281	Field Bakery Operations
TM 10-401	The Army Food Adviser
TM 10-404	Ration Breakdown Point Operations
TM 10-410	Bread Baking
TM 10-411	Pastry Baking
TM 10-412-series	Army Recipes
TM 10-415	Operation of Garrison Mess Equipment
TM 10-418	Meat Processing Ration Issue
TM 10-419	Preparation and Serving of Food in the Garrison Mess
✓ TM 10-701	Range Outfit, Field, Gasoline, M-1937, With Accessory Outfit
TM 10-725	Stove, Tent, M1941, Complete, and Burner, Oil Stove, Tent, M1941
TM 10-735	Stove, Yukon M1950
TM 10-4540-201-15	Operator, Organizational, Field and Depot Maintenance Manual: Heaters, Immersion, Liquid-Fuel-Fired (for Corrugated Cans and Tank Trailers)
TM 10-7310-203-12	Operator and Organizational Maintenance Manual: Stove, Gasoline, 2-Burner, White or Leaded Gasoline, With Hinged Windshield and Carrying Case (FSN 7310-263-8736)
TM 10-7360-204-12	Organizational Maintenance Manual Including Repair Parts: Range Outfit, Field, Gasoline, Model 59 (FSN 7360-082-2153); Burner Unit, Gasoline, Model M2 (FSN 7310-842-9247); Accessory Outfit, Gasoline Field Range (FSN 7360-082-6592)
TM 38-230	Preservation Packaging, and Packing of Military Supplies and Equipment
TM 55-601	Troop Movement Guide

APPENDIX B

DISHWASHING, DISINFECTING, AND STAIN-REMOVING PROCEDURES

1. General

a. Dishwashing Compounds. Dishwashing compounds have been developed by research and practical tests to meet specific requirements, either for mechanical or hand dishwashing. When used correctly, these compounds function properly and in a satisfactory manner. Disregard for proper procedures leads to unnecessary waste of dishwashing supplies. Nonstandard dishwashing compounds (soap or suds-forming materials) should never be used in mechanical dishwashing machines. Suds-forming materials will not operate in the spray jets. Soap or hand-dishwashing compounds should never be used in mechanical dishwashing machines because these products form an insoluble residue that clogs the spray nozzles. Dishwashing compounds, as distinguished from hand-dishwashing compounds, are intended for use in dishwashing machines only. They should not be used for hand dishwashing or for any other cleaning operation. Slight caking of dishwashing compounds does not affect their cleaning properties. Dishwashing compounds should be stored in as dry a place as possible. Precautions concerning the use of dishwashing compounds include the following:

- (1) Dishwashing compounds are not germicides. Proper rinsing methods must be used.
- (2) Exposure of hands to a solution of dishwashing compound or strong soap may cause skin irritation. Rinse such solutions from the hands with clear water to prevent irritation.

b. Authorized Supplies. The Army provides the following standard items for dishwashing, disinfecting, and stain-removing purposes:

- (1) Dishwashing compound, type I, for use in mechanical dishwashing machines having a hard water supply.
- (2) Dishwashing compound, type II, for use in mechanical dishwashing machines having a soft water supply.
- (3) Soap, laundry, bar, for use in hand dishwashing in soft water.
- (4) Dishwashing compound, hand, for use in hand dishwashing in hard, soft, or sea water.
- (5) Dishwashing compound, hand, neutral synthetic detergent, for use in hand dishwashing in hard, soft, or sea water.
- (6) Disinfectant, chlorine, food service, for use in disinfection of mess gear when rinse water of suitable temperature is not available.
- (7) Stain remover for use in hard or soft water for removing coffee, tea, and fruit stains from plastic and china tableware and for removing coffee stains from stainless steel coffee urns.

2. Dishwashing Procedures

Prescribed dishwashing procedures should be clearly explained to kitchen personnel so that each basic step is clearly understood. The proper sequence for correct dishwashing is prewashing, washing, rinsing, and air-drying.

a. Prewashing. As much solid material as possible should be removed from soiled dishes before they are washed. This is done by scraping and prewashing. In messes where the preflush machine is not available, immerse the dishes in warm water for a short time before washing them in the compound solution. A

rubber scraper or suitable mechanical device should be used to remove food particles. Scrub brushes are not satisfactory for this purpose.

b. Washing. Wash utensils thoroughly in hot water containing the proper concentration of soap or compound. The primary function of dishwashing compounds is to provide a solution which loosens and emulsifies grease and other soilage. To do this effectively, the proper concentration for the particular type of water (hard or soft) must be used. The continuous action of the washing solution on grease and other soilage tends to reduce its cleaning properties. Therefore, it is necessary to change the wash water after a certain period of time. It is more efficient and economical to use a correctly proportioned concentration and to change the wash water entirely at proper intervals than to use an excessive quantity of soap or compound without change during the entire dishwashing period. Excessive quantities of soap or compound make final rinsing difficult. If the correct concentration is maintained, the dishes will be more easily washed and rinsed.

c. Rinsing. Rinsing is necessary to remove the wash solution and to sanitize the dishes. To do this, an ample supply of hot, clear water is necessary. Use correct water temperatures (AR 40-5). In the event that the rinse water cannot be kept hot enough to sanitize the dishes, the use of chlorine disinfectant is authorized (AR 40-5).

d. Air-Drying. Under no circumstances are dish towels, paper towels, or napkins to be used for drying dishes. Dishes should be properly rinsed and allowed to air-dry. A hot rinse water is necessary, not only to provide sanitation but also to raise the temperature of the washed dishes to a point where they will air-dry rapidly.

3. Mechanical Dishwashing

a. General Procedures. Select the right compound and proportion it to the hardness of the water. A report of local water hardness may be obtained from the installation engineer. The correct type of compound and the formula for ounces of compound to gallons of water may be obtained from the installation medical officer. To figure tank capacity when it is not given, multiply the length of the tank by the

width of the tank by the height of the overflow level (in inches) and divide by 231. This will give the capacity of the tank in gallons. Post the correct quantity of compound for the equipment, in accordance with the type of local water, on or near the machine for use by subsequent operators. A compound dispensing container, kept near the machine and clearly marked with this information, will prevent waste and eliminate guesswork.

b. Dishwashing Machine Operating Procedures. Step-by-step operating procedures are given in TM 10-415 and on the instruction plate appearing on the machine. Mechanical dishwashers should be operated to provide a 40-second wash period at a temperature range of 150° to 160° F. and a 10- to 15-second rinse period at 180° F. for each rack. Use correct water temperatures (AR 40-5). Specific information concerning both single- and dual-tank dishwashing machines is given below.

(1) *Single-tank operating procedures.* Single-tank dishwashing machines are not provided with a separate rinse tank, and the flow of rinse water into the tank causes a gradual weakening of the washing solution. This condition makes the addition of detergent necessary at regular intervals.

(a) *Replenishment cycle.* For single-tank machines not equipped with detergent meters, the compound should be replenished by adding one-fourth of the original amount every 10 minutes while tableware is being washed. A great deal of waste is caused by careless operators who use an improper replenishment formula or who simply guess the amount to be used in the replenishment charge. Once the correct amount has been established, the compound-dispensing container should be clearly marked for measuring the exact replenishment charge. The replenishment formula should be posted for reference by the operators.

(b) *Detergent concentration meter.* The detergent concentration meter, when present on the machine, indicates the strength of the compound

solution in wash water. If the solution is too weak or too strong, the dial needle points to the red field on the face of the meter. Correct operating solution is indicated when the needle points to the green field.

- (2) *Dual-tank operating procedures.* Dual-tank dishwashing machines also require periodic replenishment of the dishwashing solution. In models of this type, rinse water does not run into the wash tank to dilute the solution. However, continuous washing of mess gear in the same water tends to neutralize the cleaning properties of the wash solution. The operation of dual-tank machines is a continuous process in which the dish racks are constantly carried through the water on a conveyor. The machines in large consolidated messes may be required to operate for long periods of time. If such is the case, the machine should be shut down at the end of each half hour of operation; the tank should be drained and rinsed and an entire fresh wash tank solution should be added.

4. Hand Dishwashing

The procedures for hand dishwashing are basically the same as those for mechanical dishwashing. Proper scraping and prewashing, as previously described, are important preliminary steps. Soap, laundry, bar, should be used in soft water (water having a hardness of 0 to 7 grains per gallons) and dishwashing compound, hand, in hard water (water having a hardness above 7 grains per gallon). Mechanical dishwashing compounds must not be used for hand dishwashing.

a. Wash Solutions. The temperature of the wash solution should be as hot as is comfortable to the hands of the dishwasher (120° to 125° F.). Prepare soap or dishwashing compound solution as described below.

- (1) *Bar Laundry Soap.* Prepare the soap solution by dissolving 4 to 5 ounces of bar laundry soap in 10 gallons of water. A convenient method of preparing the soap solution is to cut a bar of soap into 1-inch cubes and to

place the cubes in a No. 10 can that has holes punched in its sides and bottom. Hang the can over the faucet and let the hot water run through it while the sink is being filled. Hot water dissolves soap more readily than cold water.

- (2) *Hand-dishwashing compound.* Prepare the detergent solution by dissolving 4 ounces ($\frac{1}{2}$ standard measuring cup) in 10 gallons of water. The hardness of the local water supply may require some variation of this ratio.

b. Rinsing. After the dishes are washed in the soap or compound solution, they should be carefully prerinsed in clear, hot water (120° to 140° F.), then rinsed for 30 seconds in water at a temperature of 180° F. If the equipment available does not provide a means of maintaining the final rinse at this temperature, the dishes should be immersed in boiling water for approximately 1 minute. In unusual situations, where sufficient hot water is not available in garrison messes, disinfectant, chlorine, food service, may be used upon the recommendation of the installation medical officer (AR 40-5). In such cases, the medical officer will prescribe the quantity of this compound to be used according to the requirements of the particular situation.

c. Changing Wash Solutions. One of the most common mistakes made in hand dishwashing is to depend on an overconcentrated wash solution. Maintenance of a solution of the proper concentration during the entire washing period provides the most economical and efficient means of dishwashing.

5. Field Dishwashing Procedures

a. A messkit laundry (fig. 45), consisting of three 32-gallon corrugated cans, each with an immersion heater, is used for field dishwashing. Each group of 3 cans is capable of accommodating 80 persons. For information on the immersion heater, see appendix C.

b. The first can contains hot (but not boiling), soapy water; either bar laundry soap or hand-dishwashing compound can be used. The second and third cans hold clear boiling water. Food particles are scraped from the messkit into a suitable container or garbage pit. With the aid of a long-handed brush, the messkit is washed

thoroughly in the soap or detergent solution and then is drained and rinsed well in the second and third containers and allowed to air-dry.

c. One of the chief difficulties in washing mess gear in the field is in keeping the washing and rinsing solutions clean enough for proper efficiency. It is important to require each man to scrape as much solid food as possible from his messkit before immersing it in the wash solution. In an effort to drain off excess water, he should shake his messkit vigorously before moving to each succeeding container. However, when shaking his messkit, he must be careful not to give his unit's position away by making a lot of unnecessary noise.

6. Mess Gear Disinfecting

a. *Use of Chlorine Disinfectant.* This compound was developed for low-temperature disinfection of mess gear (not to be used in water colder than 50° F.). It is intended primarily for use in the field where dishwashing and rinsing water cannot be kept at the proper temperature for sanitizing mess gear. When dissolved in water, chlorine disinfectant releases chlorine gas which disinfects the mess gear. The efficiency of this action is increased by the length of time it comes in contact with the gear and also by agitation of the water. If the compound is dissolved in hot water, the chlorine gas is released too rapidly and the disinfecting action is soon lost. A chlorine solution for rinsing the gear of approximately 100 men is made by dissolving one package of disinfectant, chlorine, food service, in 25 gallons of water. If the water is cold, mix the contents of the package with a small amount of water in a container (canteen cup) and pour the mixture into the rinse water. Stir thoroughly to dissolve. A fresh solution must be made up for each 100 men, and a solution should not be reused.

(1) *Setting up wash line.* Using three containers, set up the washline as follows:

- (a) Fill the first container with a soapy solution of the proper strength, using bar laundry soap in soft water or hand-dishwashing compound in hard water and following instructions given in paragraph 4a.
- (b) Fill the second and third containers with unheated water and the proper

concentration of chlorine disinfectant.

(2) *Washing mess gear.*

- (a) Scrape mess gear to remove food particles.
- (b) Wash mess gear thoroughly in soapy solution in first container, using a scrub brush. Remove gear from water and shake it vigorously to drain off excess water.
- (c) Rinse mess gear in disinfecting solution in second container and drain thoroughly.
- (d) Rinse mess gear for 30 seconds in disinfecting solution in third container. Stir mess gear about vigorously while it is immersed because agitation increases the effectiveness of the disinfecting solution.
- (e) Shake mess gear thoroughly and allow it to air-dry.

b. *Use of Calcium Hypochlorite.* The use of calcium hypochlorite as a germicidal rinse is permitted only in an emergency until a resupply of disinfectant, chlorine, food service, can be obtained. The use of calcium hypochlorite as a germicidal rinse must not be adopted as an economy measure because its continuous use is considered unwise and represents a serious risk to troop health.

7. Stain Removing

A stain remover has been developed for removing coffee, tea, and fruit stains from plastic and china tableware and for removing coffee stains from stainless steel coffee urns. The stain remover is of one grade and type for use in hard and soft water. Stain remover should be stored in a cool dry place in a tightly closed container. It is not to be used on aluminum. Procedures recommended for removing stains from plastic and china tableware and stainless steel coffee urns are given below.

a. *Removing Stains from Plastic and China Tableware.*

- (1) Use sufficient hot water (170° to 180° F.) to cover the tableware from which stains are to be removed.
- (2) Dissolve 1 teaspoon to 2 tablespoons of stain remover per gallon of water,



Figure 45. Messkit laundry.

the amount to be used depending on the degree of stain. Use the smallest amount needed to remove the stains; it is difficult to remove the residue formed by excess stain remover.

- (3) Soak the dishes for 5 minutes to 3 hours, as required to remove stains.
- (4) Remove the dishes from the stain remover solution when stains have disappeared.
- (5) Wash and rinse the dishes in the dishwashing machine, using a detergent solution.

b. Removing Stains from Coffee Urns.

- (1) Fill and heat hot water boiler.
- (2) Drain leftover coffee from urn.
- (3) With coffee faucet open, open the top of the urn and rinse with hot water.
- (4) Close the coffee faucet and fill urn with hot water (175° F.). Add 2 tablespoons of stain remover per 5 gallons of hot water. Let the solution stand for 15 minutes or longer, depending on the degree of stain. Agitate the solution with a long-handled brush to loosen deposit.
- (5) Drain and rinse well.

APPENDIX C

FIELD RANGES, STOVES, AND HEATERS

1. Field Cooking Outfit, Small Detachment

a. *Description.* The field cooking outfit, small detachment, consists of a stove and attachments and the cooking utensils required to prepare rations for 15 to 40 men (fig. 46). It is designed for outdoor use by isolated detachments. The outfit is divided into two sections—the windshield section and the stove section, which weigh about 40 pounds each—and may be easily carried on two packboards (fig. 47). A 5-gallon can, which completes the necessary equipment, may be carried on a third packboard.

b. Food Preparation Techniques.

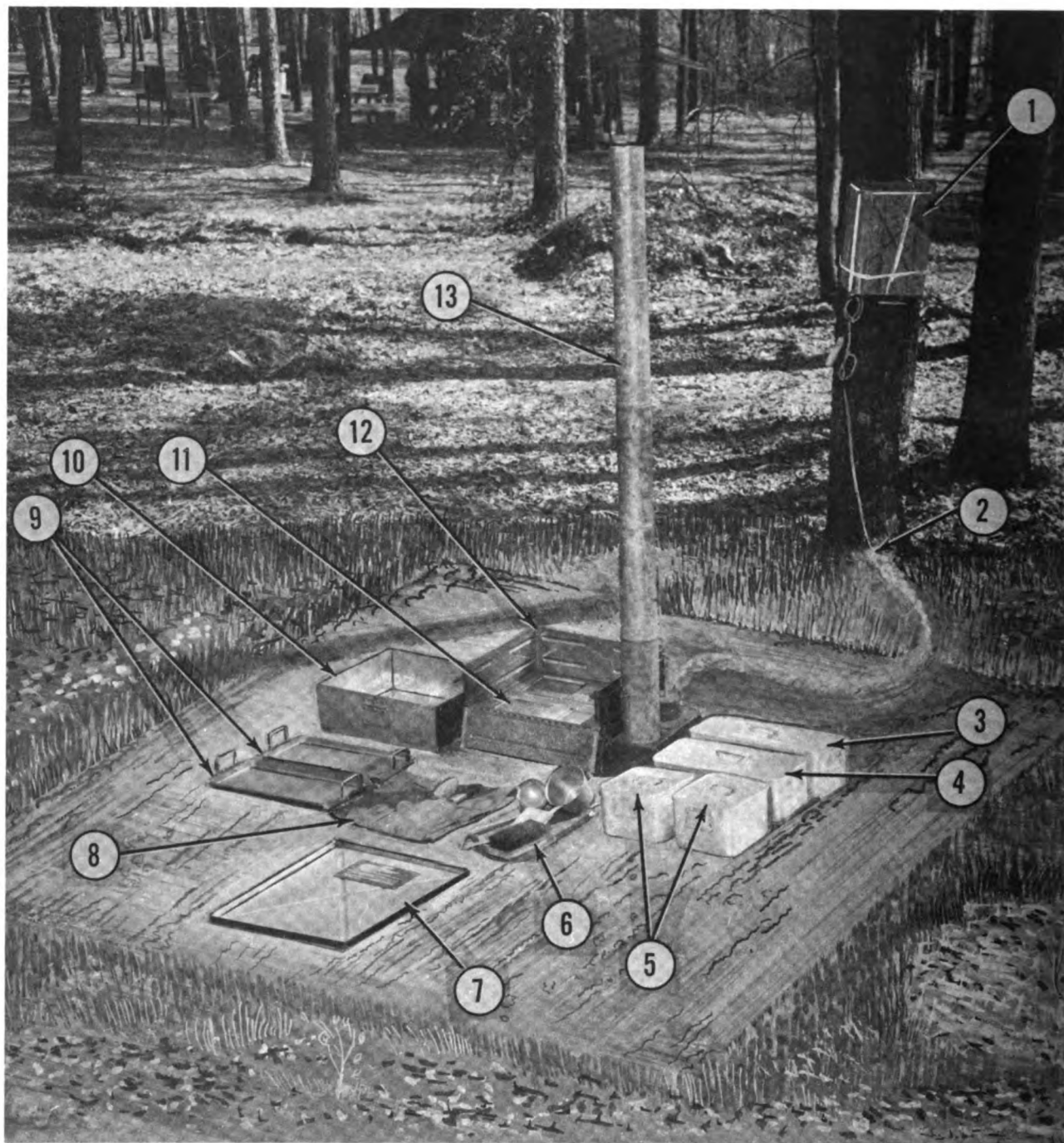
- (1) *Meal, combat, individual.* For small group feeding, the field cooking outfit may be used to prepare the meal, combat, individual, for several persons at one time. Heat all canned meat items, unopened, in hot water in either the 11- or the 13½-quart cooking pot. Use both 6-quart cooking pots with covers for heating water for beverages.
- (2) *Ration, operational, B.* For feeding a larger group, the field cooking outfit may be used to prepare the standard B ration. Use either the 11- or the 13½-quart cooking pot partially filled with water to heat unopened cans of meat and vegetables (fig. 48). Use the 6-quart cooking pots to heat water for beverages, to reconstitute dehydrated vegetables, or to heat cereals and soups. Place the windshield cover over the windshield to prevent heat from escaping while the food is heating.

c. General Hints and Precautions.

- (1) If the cooking outfit is used indoors on a wooden floor, place the stove on

stones or on a bed of sand or dirt. To avoid carbon monoxide and lead poisoning, make certain that the air conditioning/heating pipe (stovepipe) provided with the outfit leads outside. If the stove is used outdoors, clear the ground around the stove of leaves and flammable material. Select a site that is level and as sheltered as possible.

- (2) Handle fuel with caution. It can be explosive. Have gasoline can 18 to 25 inches above burner level. Attach the can to a tree or pole as far away from the stove as possible. Before elevating the gasoline can, be sure that the valve on the burner-valve assembly is shut off so that the burner well will not flood. Always insert the gasoline can adapter air vent tube into the can *diagonally* rather than straight down (fig. 49). Do not attempt to bend the tube or try to make it fit straight because this will prevent fuel from flowing properly and may break the tube.
- (3) Keep the large rubber washer on the gasoline can adapter dry and take care during storage to prevent its warping. Gasoline or moisture on the washer will prevent it from forming a tight seal when the adapter plug cap is screwed into the gasoline can opening and will cause the fuel to leak around the opening when the can is inverted.
- (4) Bury that part of the hose that is on the ground if there is danger that someone will trip over it.
- (5) Before lighting the stove, make certain that all hose connections and the adapter are tight.



- | | |
|-------------------------|----------------------------------|
| 1 5-gallon gasoline can | 8 Cutlery roll |
| 2 Hose (buried) | 9 Frying pans |
| 3 13½-quart cooking pot | 10 Sterilizing pan |
| 4 11-quart cooking pot | 11 Stove |
| 5 6-quart cooking pots | 12 Windshield |
| 6 Utensils and brush | 13 Air conditioning/heating pipe |
| 7 Windshield cover | |

Figure 46. Field cooking outfit, small detachment.

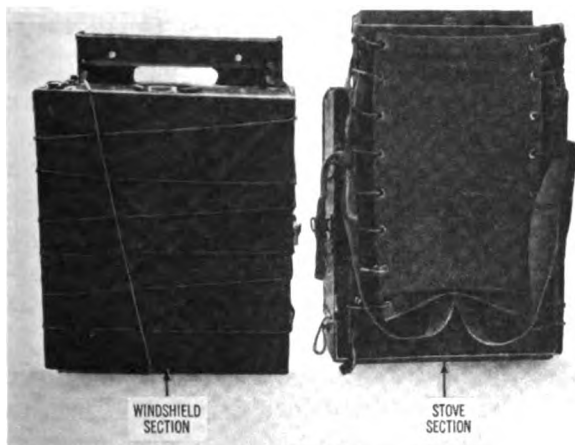


Figure 47. *Field cooking outfit, small detachment, packed for carrying.*

- (6) Use caution when relighting a hot burner. First, remove burner from stove; second, open valve and dampen burner with liquid fuel; third, relight burner and replace it slowly in the burner compartment.

WARNING: Never attempt to relight a hot burner when the burner is in the stove.

- (7) If the stove goes out by accident and the fuel continues to drip for any length of time, remove pots, pans, and perforated plates and check for the presence of gasoline or vapor. This precaution must be taken to prevent the explosion of any accumulated gas-



Figure 48. *Preparing the standard B ration on the field cooking outfit, small detachment.*



Figure 49. Inserting gasoline can adapter air vent tube into can.

oline or vapors in the stove section when the stove is relighted. Do not remove the perforated plates while the stove is in operation because the plates act to maintain a steady draft.

- (8) When opening drip valve before lighting burner, be sure to hold the burner perfectly level to prevent fuel from leaking out of a crack between the burner cap and burner body and running down the burner body. The burner cannot be lighted if this fuel is lost. When smoke from an ignited paper might reveal your position to the enemy, light the burner with a match.

2. Stove, Gasoline, Two-Burner

a. Description. The stove, gasoline, two-burner (FSN 7310-263-8736) is designed for the use of troops who prepare and cook their own food and is used extensively by mountain and jungle troops. Food for 6 to 15 persons can be prepared with this stove. The stove (fig. 50) is light to carry and easy to operate. It is economical in fuel consumption and operates successfully on leaded or unleaded gasoline. It is capable of operating from 3 to 5 hours on a single filling. The major components of the stove are a carrying case, a windshield, a fuel tank, legs, two burner head assemblies, and two

fuel valve assemblies. For instructions on how to light and operate the stove, see TM 10-7310-203-12.

b. Food Preparation Techniques. Prepare food on the two-burner stove as follows:

- (1) Use the carrying case cover as a griddle (A, fig. 51).
- (2) Use the carrying case as a sterilizing pan to heat water for washing mess-kits and the griddle (B) or to heat canned meat items.
- (3) Heat water in a cookset cooking pot while heating food or frying bacon in cookset frying pan (C).
- (4) Use canteen cup to heat water for beverages and use the messkit pan to fry bacon or heat food (D).

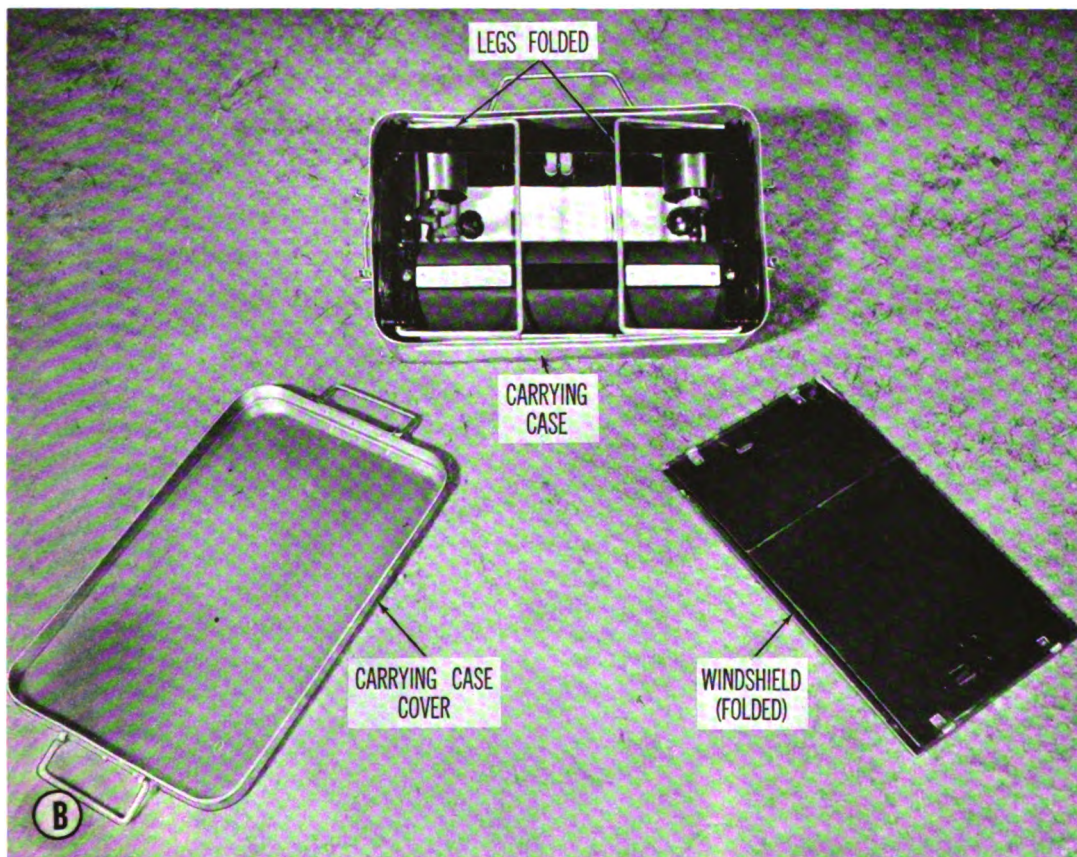
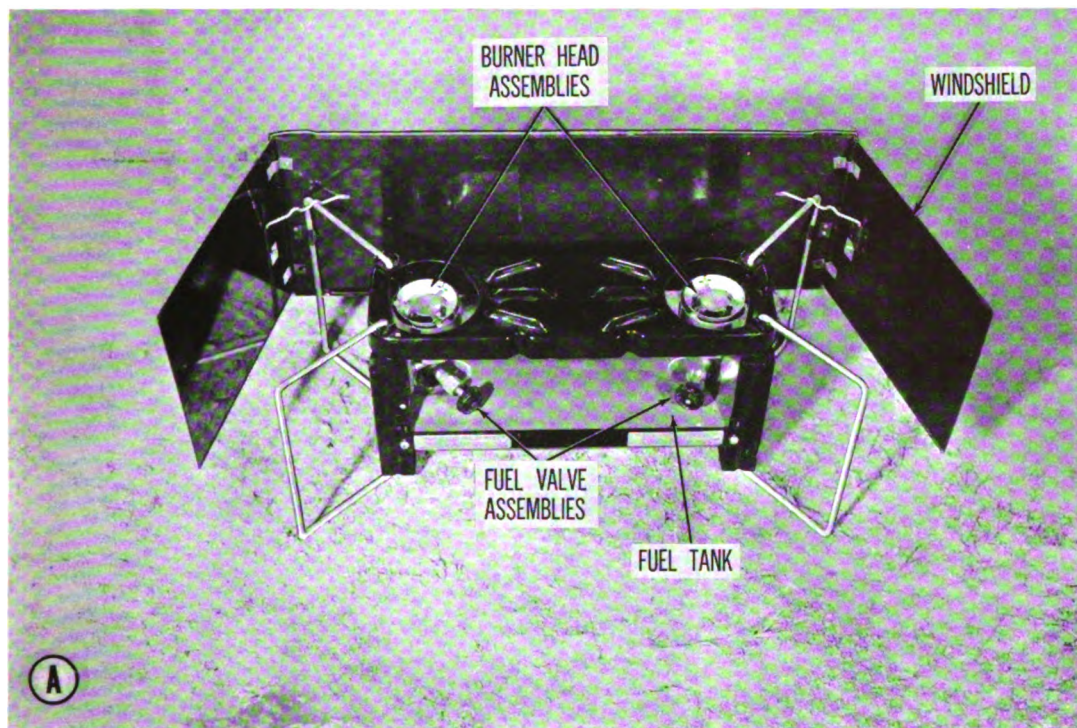
c. General Hints and Precautions.

- (1) If the stove is used indoors on a wooden floor, place it on a level bed of sand, stones, or dirt and provide proper ventilation. If the stove is used outdoors, clear the ground around the stove of leaves and other flammable material. Select a site that is level and as sheltered as possible. Always use windshield on stove when cooking outdoors and shield the stove carefully from wind and wind-driven elements.
- (2) Avoid carrying the stove upside down. It should be in an upright position at all times, particularly when the fuel tank is filled.
- (3) Since fuel can be explosive, handle with caution. Do not fill fuel tank near an open flame. Avoid putting more than 2 pints of fuel in the tank at a time. This keeps enough air in the fuel tank for the flame to burn blue.
- (4) To keep pump plunger assembly in operating condition, lubricate the leather air pump cup in the pump plunger assembly frequently.

3. Range Outfits, Field, Gasoline

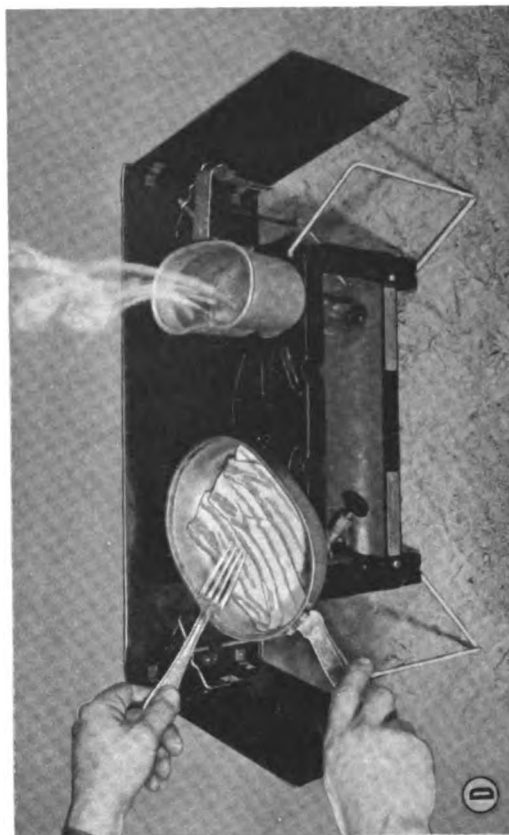
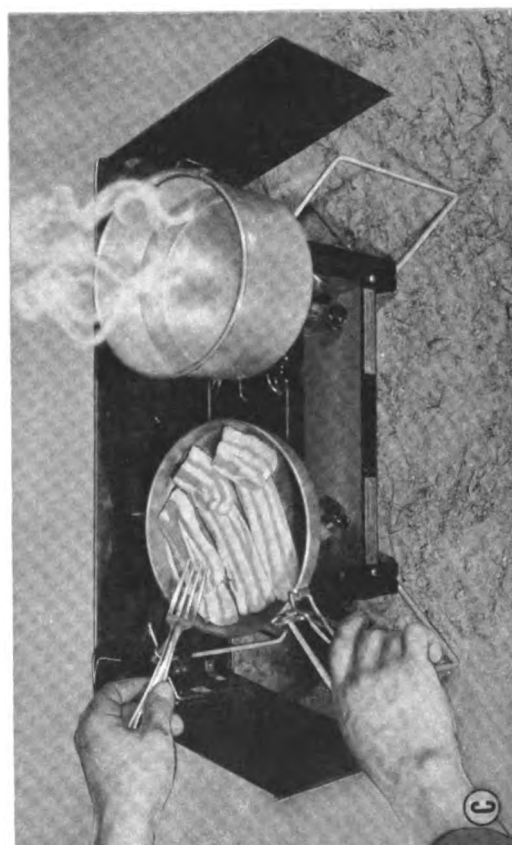
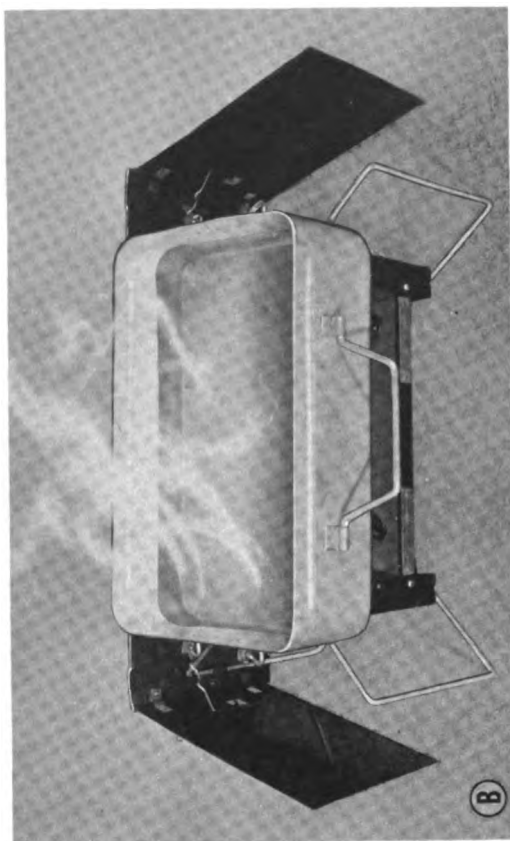
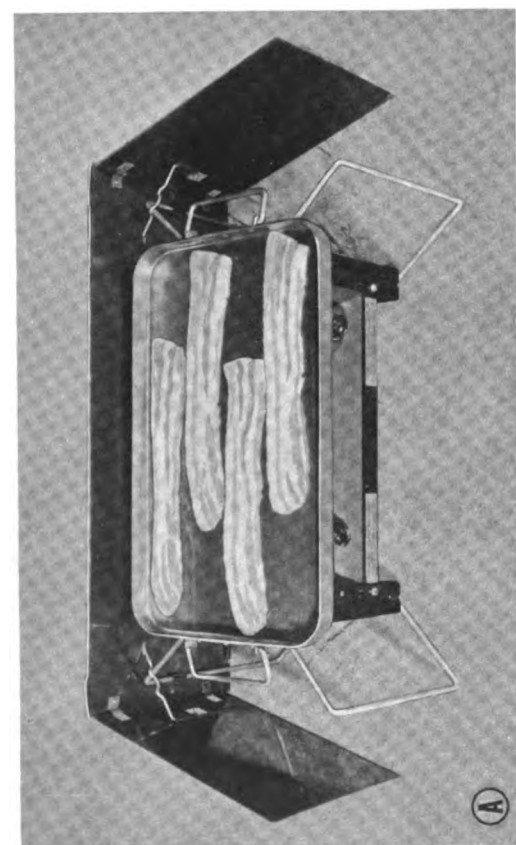
a. General. Two gasoline field range outfits, the M1937 and the M59, are currently in use (fig. 52).

- (1) Both models are adaptable to the different cooking requirements of field operations. The ranges, which may



A.—Stove with windshield attached, ready for use
 B.—Stove in carrying case

Figure 50. Stove, gasoline, two-burner.



A.—Use of carrying case cover
 B.—Use of carrying case
 C.—Use of cookset frying pan and cooking pot
 D.—Use of messkit and canteen cup

Figure 51. Heating water and cooking on two-burner stove.



Figure 52. Range outfits, field, gasoline.

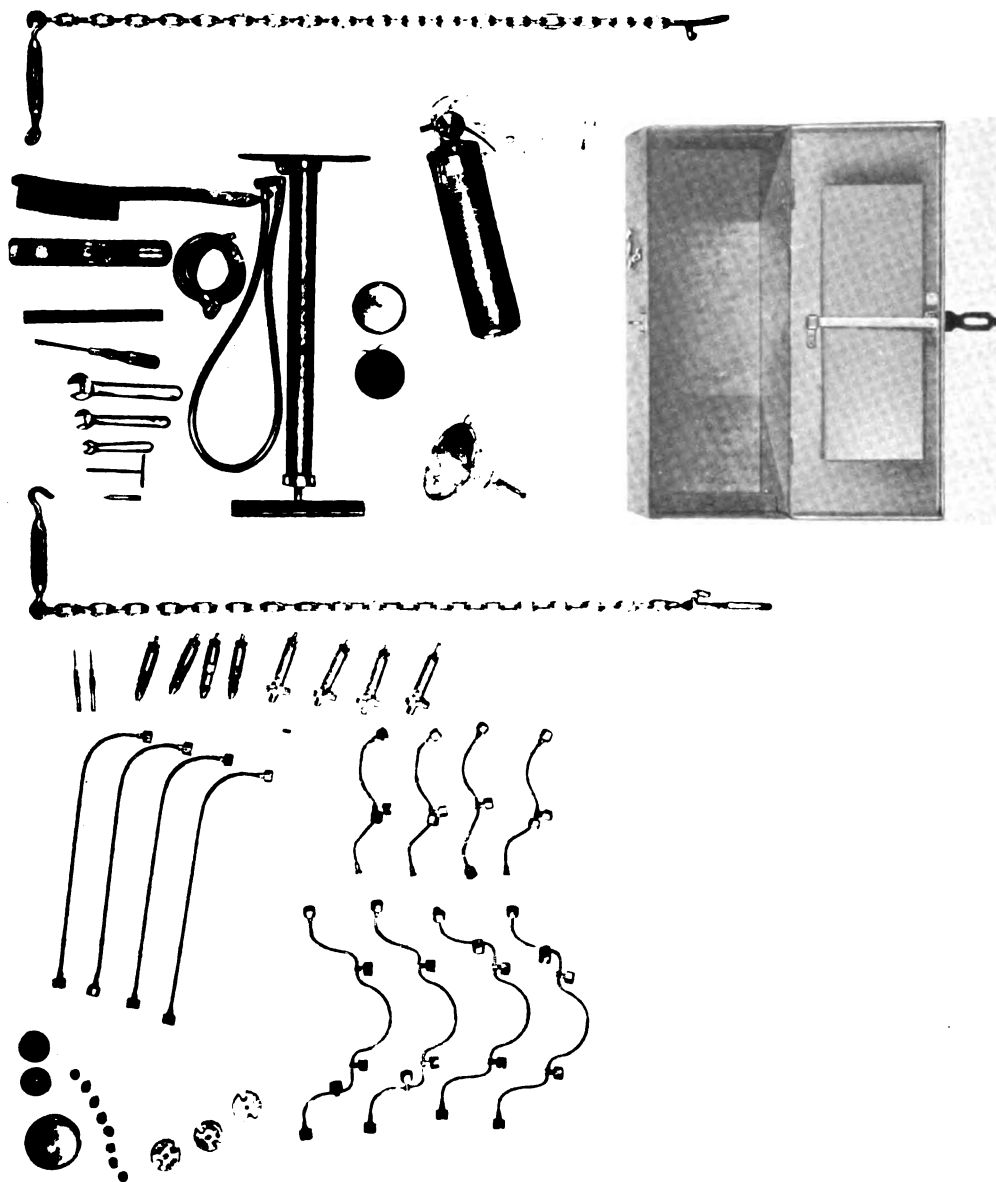
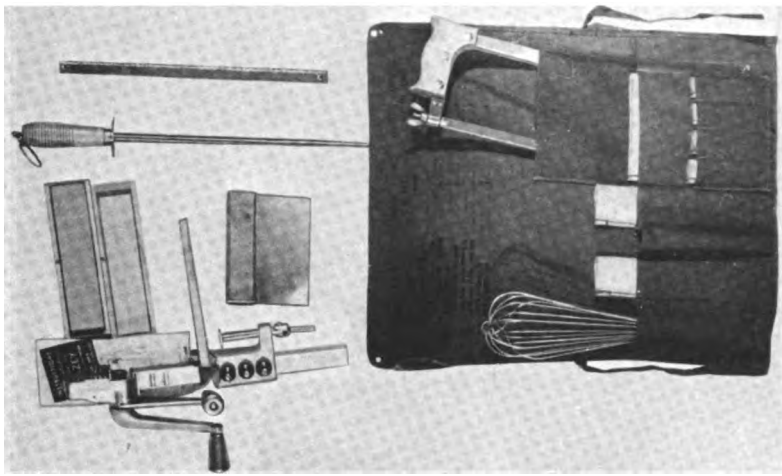
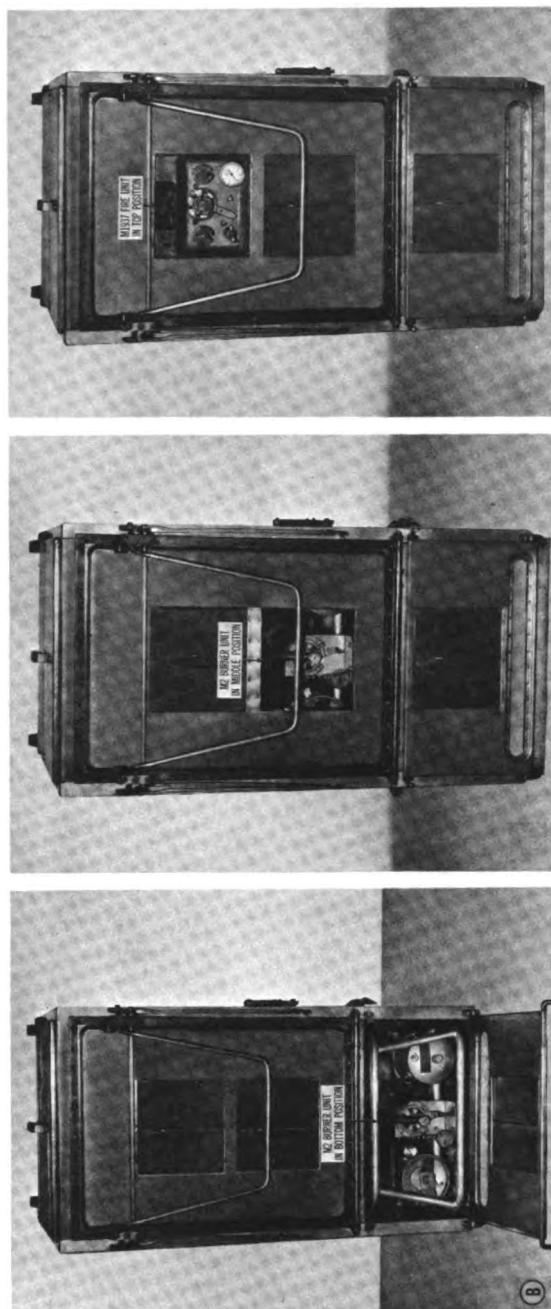
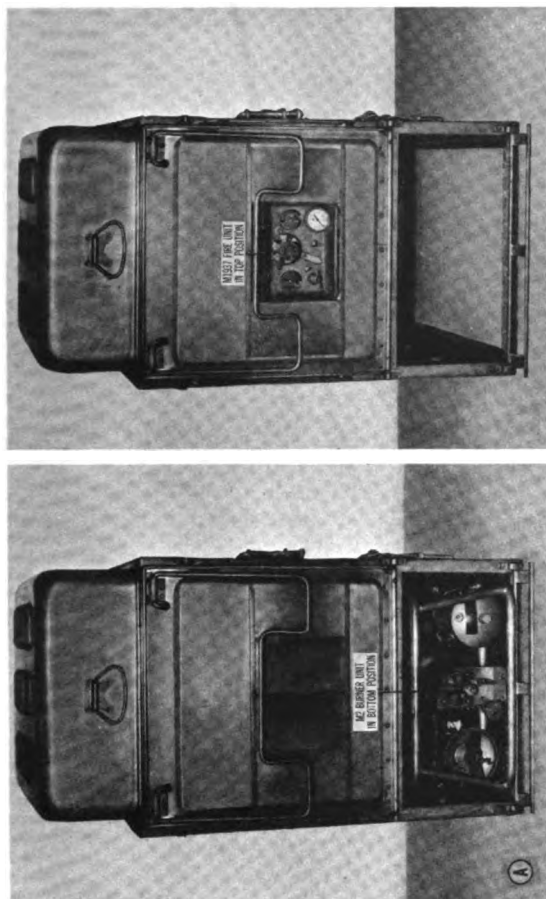


Figure 53. Components of M1937 field range accessory outfit.



A.—M59 range B.—M1937 range

Figure 54. Field ranges with burner or fire unit in various positions.

be used singly (for 50 men) or in a group, are portable and can be operated in transit. The necessary pots, pans, cooking and serving utensils, and knives come with each range. Additional information is contained in TM 10-701 (M1937 range) and in TM 10-7360-204-12 (M59 range).

- (2) One accessory outfit is issued for every group of four or fewer ranges. The accessory outfit consists of tools, a toolbox, tiedown chains, and accessories such as a can opener, butcher's saw and blade, egg whip, and fire extinguisher. The accessory outfit issued with the M1937 range (fig. 53) also includes spare parts.
- (3) The gasoline-burning M1937 fire unit described in TM 10-701 and the gasoline-burning M2 burner unit described in TM 10-7360-204-12 can be used with either range (fig. 54). The unit can be placed in two positions in the M59 range (A) and in three positions in the M1937 range (B).

b. Food Preparation Techniques. Foods may be cooked on either range by baking, roasting, boiling, griddle cooking, and deep-fat frying if the fire or burner unit is placed in the proper position. In the following instructions, the terms "burner unit" and "fire unit" are used interchangeably.

(1) *Baking.*

- (a) *M1937 range.* See TM 10-701 for instructions on how to determine the proper oven temperature and on how to adapt the range for baking bread and pastry by constructing shelves and pan rests.

1. *Biscuits and cobblers.* Biscuits and cobblers may be baked when the fire unit is in either the bottom or the middle position. When fire unit is in the bottom position, place baking pan containing biscuits (fig. 55) or cobbler on middle shelf or pan rest. Close cabinet front and top doors. When fire unit is in the middle position, place baking and roasting pan in top position and place baking pan

containing biscuits or cobbler in baking and roasting pan. Close cabinet front and top doors.

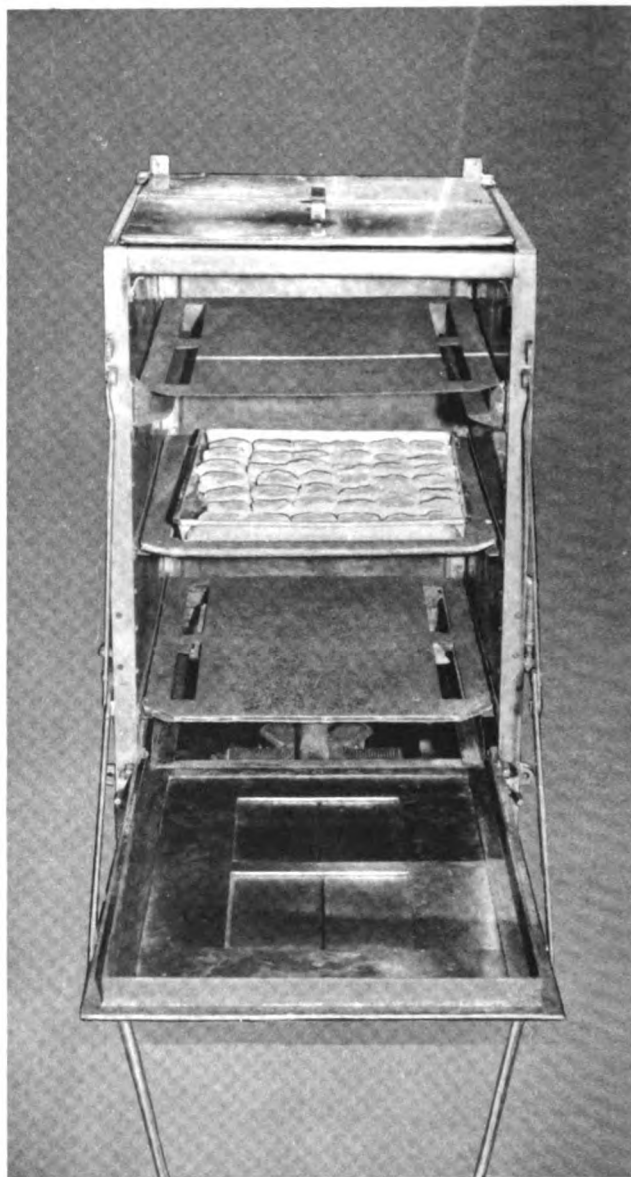


Figure 55. Use of M1937 field range for baking biscuits (fire unit in bottom position).

2. *Cakes.* Place fire unit in middle position. Place baking pan in top position and place cake pan in baking pan (fig. 56). The five indentations in the bottom of the baking pan will allow the heat to circulate evenly around the cake pan. Close cabinet front and top doors.



Figure 56. Use of M1937 field range for baking cakes.

(b) M59 range.

1. *Biscuits and cobbler.* Biscuits and cobbler may be baked when the burner unit is in the top or the bottom position. When burner unit is in the bottom position, place baking and roasting pan containing biscuits or cobbler on top of range. Close door and lid of cabinet. When burner unit is in the top position, place baking and roasting pan on top of range and place baking pan containing biscuits (fig. 57) or cobbler in baking and roasting pan. Close door and lid of cabinet.

2. *Cakes.* Follow directions in (a) 2 above, except place burner unit in bottom position.

(2) Roasting.

(a) *M1937 range.* Place fire unit in middle or bottom position; place roasts, in the baking and roasting pan, in the top position (fig. 58). Cover pan if roasts are to be cooked

by the moist-heat method. Close cabinet front and top doors.

(b) *M59 range.* Place burner unit in top or bottom position. Place roasts, in baking and roasting pan, on top of range. Cover pan if roasts are to be cooked by the moist-heat method. Close door and lid of cabinet.

(3) *Boiling.* Place burner unit in bottom position. Use either the 40- or the 60-quart cooking pot, covered, for boiling. Place cooking pot in cooking pot cradle in bottom of cabinet. Close cabinet front and top doors. When a double boiler is needed, cover the bot-



Figure 57. Use of M59 field range for baking biscuits (burner unit in top position).

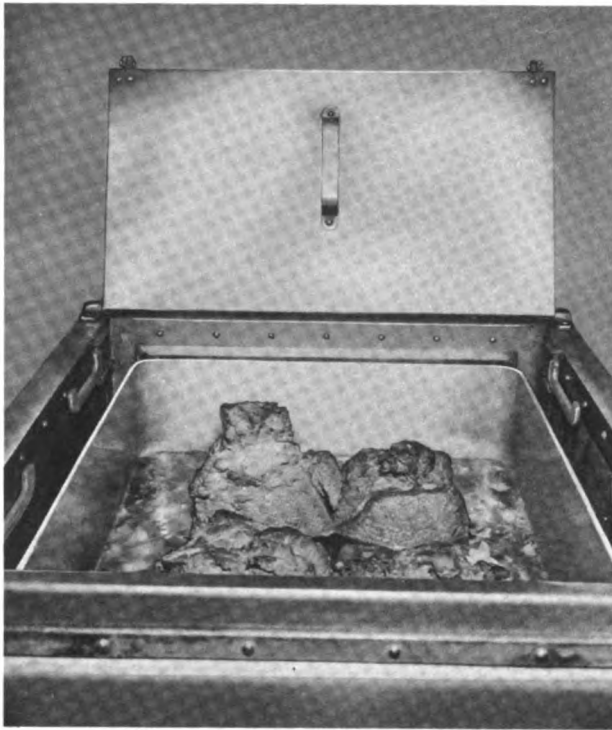


Figure 58. Use of M1937 field range for roasting.

tom of the 60-quart cooking pot with water, place pot in the cradle, place 40-quart pot in the 60-quart pot, and cover. Boiling and roasting may be done at the same time (fig. 59).

- (4) *Griddle cooking.* Place burner unit in the top position. Swing griddle supports out from brackets; turn cover of baking and roasting pan upside down and fit it onto the griddle supports. Fit one arm protector, with wide side faced out, over the edge of the griddle and along the front of the cabinet. Fit the other arm protector, with wide side faced out, over the edge of the griddle and along the side of the cabinet on which the cook is working (fig. 60). Close cabinet front door. If necessary, grease the griddle lightly.
- (5) *Deep-fat frying.* When using the M1937 range, place fire unit in middle position and place baking and roasting pan in top position. When using the M59 range, place burner unit in top position and place baking and roasting pan on top of range. Fit arm

protectors, with wide side faced in, over front and one side of cabinet and over corresponding edges of pan. Fill pan one-third to one-half full of melted shortening. Heat shortening and drop a bread cube into the hot grease; if the bread browns in about 20 seconds, the grease is hot enough to add the food to be fried. Cook food until well browned. Close cabinet front door but leave top door open to prevent steam from forming. Use skimmer to remove fried food from pan (fig. 61).

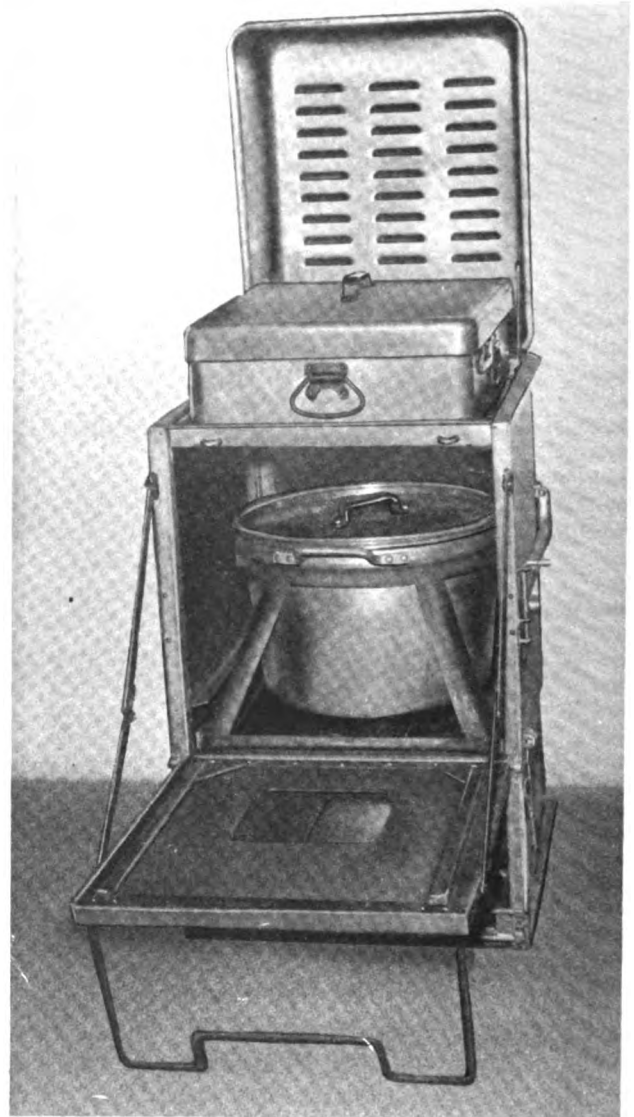


Figure 59. Use of M59 field range for roasting and boiling.



Figure 60. Use of M59 range for griddle cooking.

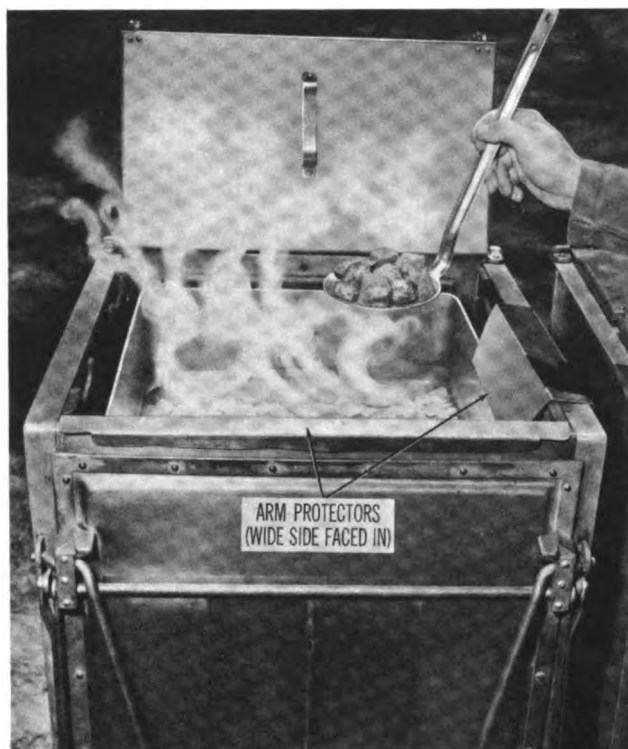


Figure 61. Use of M1937 range for deep-fat frying.

range and place on well-cleared, level ground. When using the M1937 fire unit, improvise a four-legged support of angle irons or pipe to keep bottom of pot above the unit, or use two pot cradles as shown in A, figure 62. One pot cradle is required to keep the bottom of the pot above the generator of the M2 burner (B); however, the roasting and baking pan may be placed on the burner frame (C).

(6) *Use of fire or burner unit alone.* The fire or burner unit may be used alone for boiling or for keeping food hot in an emergency. Remove unit from

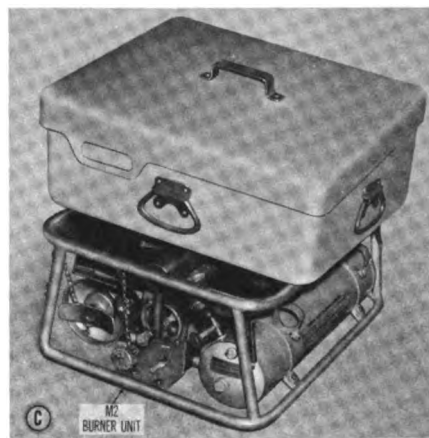


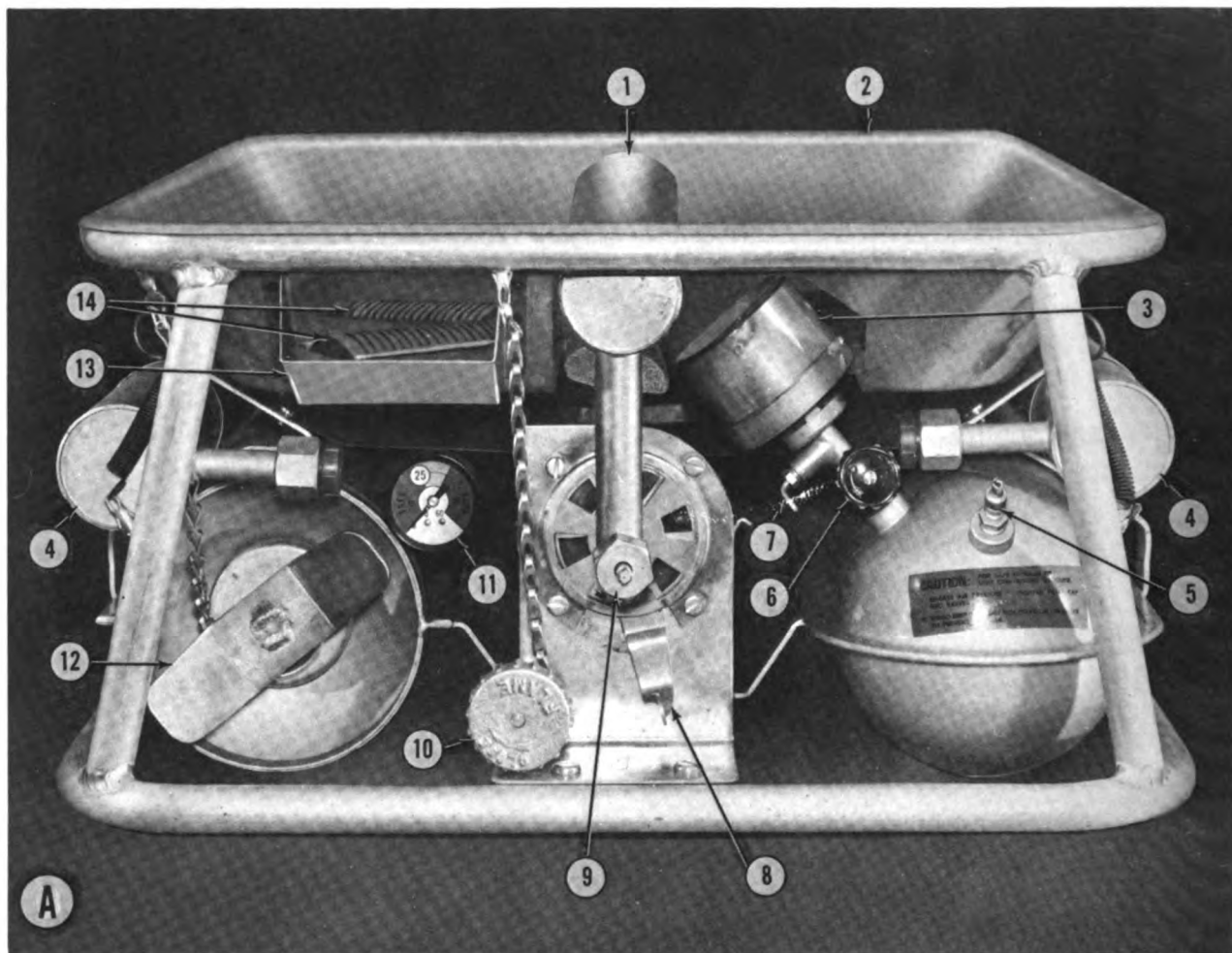
Figure 62. Use of fire and burner units alone.

c. General Hints and Precautions.

- (1) Provide a firm, level, and well-drained foundation for the range. Use heavy timbers or planks, if available. Install cabinets in kitchen truck or in kitchen baggage car as described in chapters 3 and 4, respectively.
- (2) Fill the burner unit fuel tank at least 20 feet away from the range and downwind. Do not attempt to fill the fuel tank when a train or truck is in motion. Never attempt to fill the tank

while the flame is burning or when the burner is hot. Spilled gasoline is dangerous; not only the flame, but also the heat from a hot burner, can cause fire or explosion on contact with spilled fuel or gasoline vapors.

- (3) When lighting the burner unit, observe installation fire regulations.
- (4) If a fire occurs during operation of the M1937 fire unit, immediately close fuel valve and flame valve to put out burner flame quickly. If a fire occurs



- | | |
|---|----------------------|
| 1 Generator | 8 Air shutter handle |
| 2 Top shield | 9 Flame valve |
| 3 Preheater burner head | 10 Flame valve knob |
| 4 Spare generator | 11 Air pressure gage |
| 5 Air valve | 12 Filler cap |
| 6 Preheater valve | 13 Mirror |
| 7 Preheater orifice cleaner control lever | 14 Burner head |

A—Front view

Figure 63. M2 burner unit.

during operation of the M2 burner unit, close flame valve. Pull burner unit from cabinet and use fire extinguisher to prevent flames from spreading. After unit cools, relieve air pressure by loosening fuel tank filler tube cap. Never relieve air pressure until unit has cooled, because gasoline vapors escaping from the filler tube will ignite.

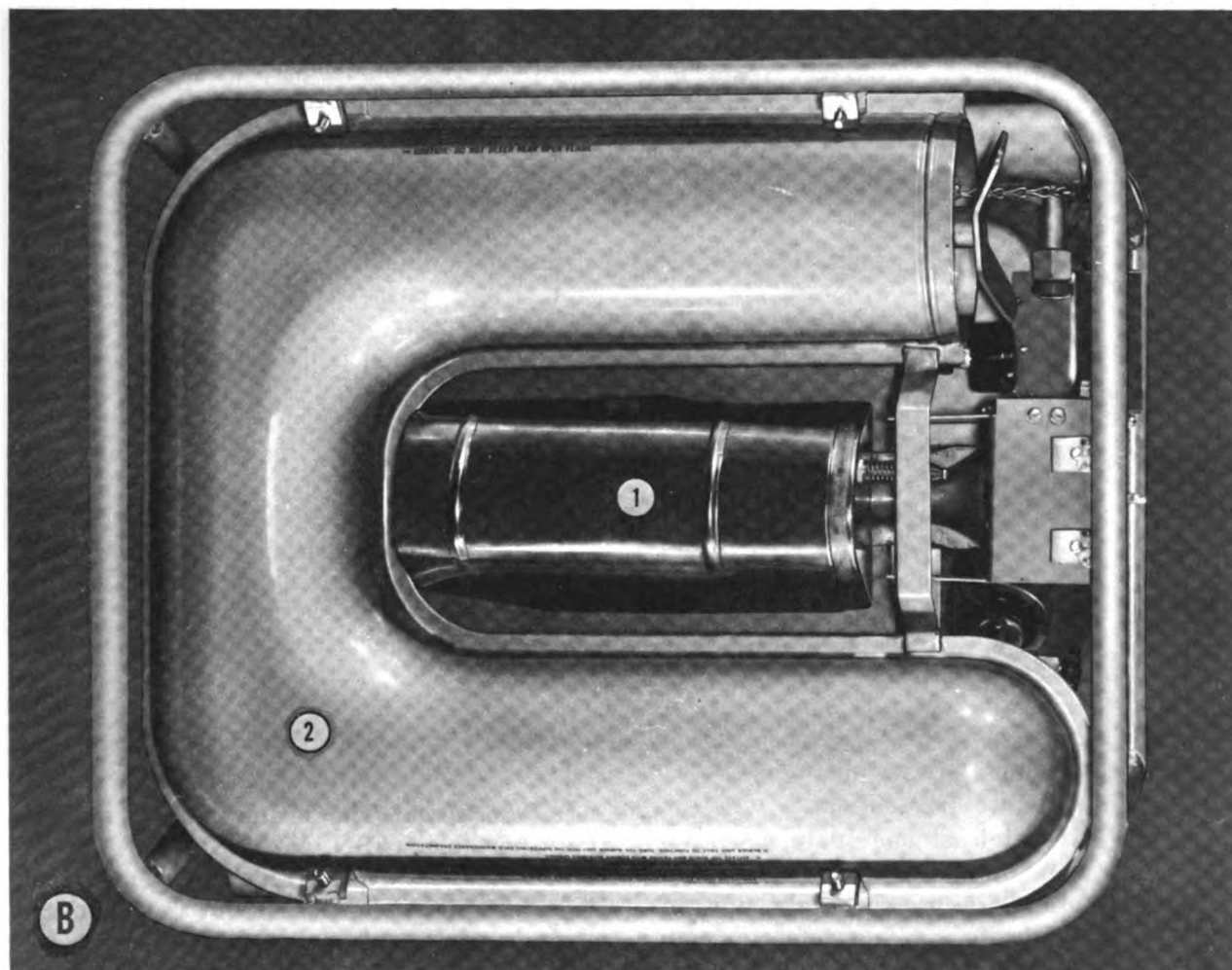
- (5) When cooking in the top position (M1937 range) or on top of the stove (M59 range), use arm protectors (figs. 60 and 61) to prevent burns.

d. *M2 Burner Unit.* Figure 63 shows two views of the M2 burner unit. Newer models of

the unit have a U-shaped tank (B); however, the older models have two (left and right) tanks.

(1) *Operating instructions.*

- (a) Check to see that flame valve (9, A) and preheater valve (6) are closed tight.
- (b) With burner unit standing on end, remove filler cap (12) and fill tank with 2 to 2¼ gallons of leaded or unleaded gasoline (gasoline should be just visible at bottom of filler tube). Replace cap and tighten; remove preheater shield (1, B) from bottom of unit.



1 Preheater shield

2 U-shaped tank

B—Bottom view

Figure 63—Continued.

- (c) Place burner unit in horizontal position.
 - (d) Remove cap from air valve (5, A) and attach hand air pump.
 - (e) Pump burner unit until air pressure gage needle (11) reads 10 to 20 pounds pressure; remove air pump and replace cap.
 - (f) To start, clean preheater orifice by twisting lever (7) on orifice cleaner several times. Leave lever in down position, open valve one-quarter turn for 2 to 5 seconds to wet top surface of preheater burner head (3), then close valve. Burn off gasoline from wet surface. Before flame extinguishes, open valve one-quarter turn to start preheating operation. Place shield over preheater burner and main generator.
 - (g) Preheat approximately 3 minutes or until full length of generator (1) is hot to the touch.
 - (h) Open flame valve (9); the main burner will ignite.
 - (i) Adjust air shutter (8) for sea green flame at burner surface.
 - (j) Turn preheater valve (6) off.
 - (k) Maintain operating pressure within "SAFE" operating range on air pressure gage dial (11).
 - (l) If pressure exceeds "SAFE" range, reduce flame to approximately half size and continue operation for $\frac{1}{2}$ hour. If pressure increase persists, turn unit off, remove from cabinet, and allow unit to cool before placing it back in operation.
 - (m) To shut down burner unit, close flame valve (9) and allow burner to cool. Release pressure by upending unit and loosening filler cap (12).
- (2) *Maintenance instructions.*
- (a) Have at least one spare generator (4, A) attached.
 - (b) Maintain a pressure-tight unit by periodically checking connections for tightness.
- Caution:** Do not tighten joints while unit is under pressure.
- (c) Keep burner slots clean with burner slot cleaner blade provided.
 - (d) When pressurized mixture from preheater valve fails to burn continuously during preheating, perform one or more of the following steps.
 1. Clean preheater orifice by twisting orifice cleaner control lever (7) several times; leave lever in down position and check preheater by relighting.
 2. Shut preheater valve (6), unscrew burner head, remove preheater generator assembly, and clean or replace generator screen. Replace burner head and relight.
 - (e) To correct low flame on main burner, close and open flame valve (9) several times to clean the orifice; then relight.
 - (f) If low flame persists on main burner, proceed as follows.
 1. Shut off unit.
 2. Release tank pressure.
 3. Remove top shield (2) by lifting corner retaining springs clear of shield.
 4. Loosen gas inlet hex nut on main burner generator.
 5. Disengage flame valve end of main burner generator from air shutter and lift generator from unit.
 6. Replace with new main burner generator.
 7. Replace top shield and fasten with corner retaining springs.
 - (g) If burner unit fails to function, turn the burner unit in to the supporting field maintenance organization.

4. Heater, Space, Radiant-Type, Portable (Yukon M-1950)

a. *Description.* The heater, space, radiant-type, portable (FSN 4520-287-3353) is designed for heating the following tents: tent, hexagonal, lightweight, M-1950; tent, general-purpose, small; and tent, arctic, 10-man. Usually, the heater is used with a gasoline burner assembly, but in an emergency wood or coal may be used as fuel. When necessary, the top surface of the heater may be used to heat rations or water (fig. 64). For instructions on

how to light and operate the heater, see TM 10-735.

b. Food Preparation Techniques. Use canteen cup or cookset cooking pot to heat water for beverages. Use messkit or cookset frying pan to heat opened canned meat items of the meal, combat, individual.

- tions are tight and that necessary tent shields are properly adjusted.
- (b) Keep heater level so that burner assembly will produce an even flame within the heater.
- (c) Protect fuel line so that it cannot be pulled loose accidentally. If neces-



Figure 64. Heating water and canned meat on top surface of Yukon M-1950 space heater.

c. General Hints and Precautions. If the heater is used on a wooden floor, place the heater on a level bed of sand, stones, or dirt, regardless of the type of fuel used.

- (1) *Liquid fuel.* When burning liquid fuel, observe the following precautions:
 - (a) Make sure that all stovepipe connec-

- sary, dig a small trench to hold the line where it crosses the tent floor, or bury the line (fig. 64). Never let the line touch a hot heater.
- (d) When adjusting fuel flow, turn drip valve lever carefully to prevent damage to the threads. Do not force

the valve past closing point. Check rate of fuel flow at regular intervals. Rate will change as fuel supply level drops and will require some adjustment.

- (e) When lighting heater, keep face away from open front door; an initial flash is likely to occur when the fuel ignites. When smoke from ignited rags or paper in the burner might reveal your position to the enemy, light the burner with a match. Do not leave the heater unattended while it is in operation. To prevent the heater body from overheating or warping, do not maintain a hotter fire than is necessary.
 - (f) If the flame is accidentally extinguished, close drip valve immediately. When heater has cooled, open heater door and wipe up any excess fuel inside heater. Wait 2 or 3 minutes longer for vapors to escape before relighting burner.
 - (g) Keep all gasoline outside the tent. Gasoline cans, even when tightly closed, should never be stored in a tent.
 - (h) The gasoline can should be placed above the level of the heater. Keep the large rubber washer on the gasoline can adapter dry to prevent flammable vapors from leaking around the opening when the gasoline can is inverted. Always insert the gasoline can adapter air vent tube into the gasoline can diagonally rather than straight down (fig. 49). Do not attempt to bend the tube or try to make it fit straight because this will prevent the fuel from flowing properly or will break the tube.
 - (i) Be sure that there is neither gasoline spillage nor flammable material on or near the heater.
- (2) *Solid fuel.* When burning coal or wood, observe the following precautions.
- (a) Feed a small amount of fuel at a time until bed of fuel is burning brightly.
 - (b) Do not overheat the heater body.

- (c) Never pour fuel oil or gasoline on the fire or use them to start a fire.
- (d) Do not allow ashes to accumulate below grate.
- (e) Remove clinkers to prevent grate from becoming blocked.

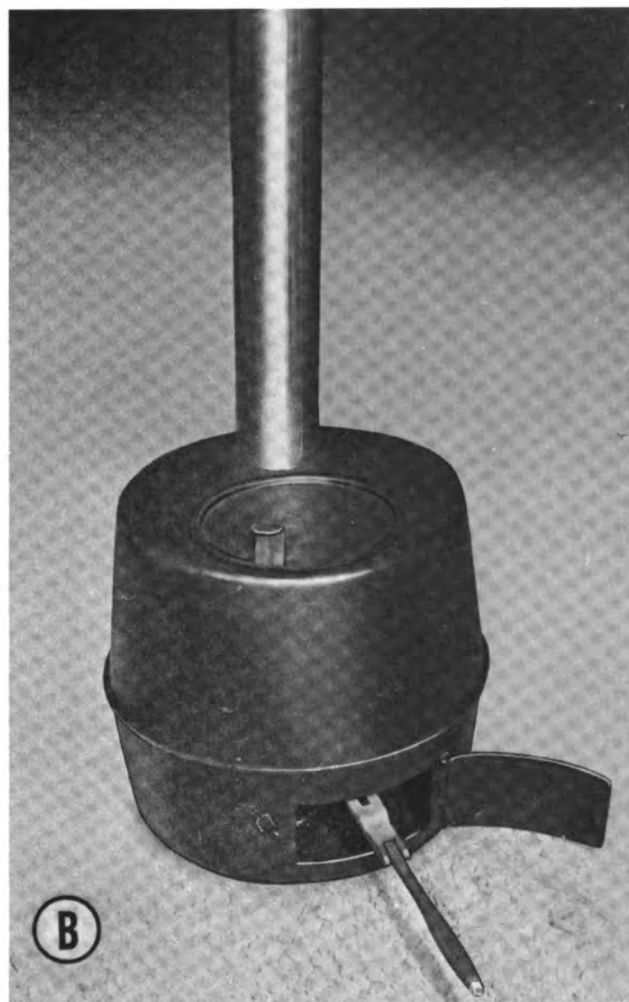
5. Heater, Space, Radiant-Type, Portable

a. Description. The heater, space, radiant-type, portable (formerly stove, tent, M-1941) is designed for use in any one of the following tents: tent, command post, M-1945; tent, general-purpose, large; tent, general-purpose, medium; tent assembly, M-1942; and tent, frame-type, insulated sectional. The heater (fig. 65) may be operated with wood or coal or, if an oil burner attachment is used, with diesel oil, light fuel oil, or gasoline. Conversion from one type of operation to another may be done quickly and easily. For instructions on how to light and operate the heater, see TM 10-725.

b. Food Preparation Techniques. This heater is designed to heat a tent, and messing facilities are usually available in the areas where the heater is used. However, the heater can be used in an emergency to prepare the meal, combat, individual. Use canteen cup for heating water for beverages and a messkit pan for heating opened canned meat items.

c. General Hints and Precautions.

- (1) *Liquid fuel.* When burning liquid fuel, observe the following precautions:
- (a) Keep flammable materials away from the heater. If the heater is used on a wooden floor, place it on a level bed of sand, stones, or dirt.
 - (b) To prevent explosion of flammable vapors, always place lighted paper in hot burner before turning on fuel.
 - (c) Never let fuel hose touch a hot heater and never expose hose to heat or sun. Protect the fuel hose so that it cannot be pulled loose accidentally. If necessary, dig a small trench to hold the hose where it crosses the tent floor, or bury the hose (A, fig. 65).
 - (d) When using gasoline, do not operate fuel burner at its full capacity with adjustment knob set at 9.
 - (e) Do not feed excess fuel to a cold burner before lighting. Smoke and



A.—With oil burner attachment
B.—With grate for solid fuel

Figure 65. Portable radiant-type space heater.

soot will result until the excess fuel burns out.

- (f) When using very heavy fuel oil, remove pilot ring to provide adequate draft. Do not set adjustment knob below 3 or 4.
- (g) Keep gasoline outside of tent. *Never* store a spare can of gasoline in the tent.
- (h) When using light fuel oil, store the container inside the tent. The fuel oil will then be warm enough to flow through the hose. A spare container of fuel oil should be kept inside the tent ready for use.
- (i) The gasoline can should be placed above the level of the heater. Al-

ways insert the gasoline can adapter air vent tube into the gasoline can diagonally rather than straight down (fig. 49). Do not attempt to bend the air vent tube or try to make it fit straight. This will prevent fuel from flowing properly and will break the tube.

- (j) Keep the large rubber washer on the gasoline can adapter dry. This will prevent the fuel from leaking around the opening when the can is inverted.
- (k) If the flame is accidentally extinguished, turn inlet knob to OFF position immediately and wipe up excess fuel from burner bottom.

Open heater lid to let flammable vapors escape and wait 2 or 3 minutes before relighting.

(2) *Solid fuel.* When burning solid fuel, observe the following precautions:

- (a) Do not put much coal on a newly made fire. Feed a small amount at a time until a thick bed of fuel is burning brightly. Do not pour gasoline or fuel oil on fire.
- (b) Make sure that all stovepipe connections are tight and that necessary tent shields are adjusted properly.
- (c) Make sure that damper can be operated and that it binds enough to hold its position.
- (d) Do not allow ashes to accumulate below the grate, because they retain heat and cause the grate to warp. Remove clinkers to prevent grate from locking or becoming blocked.

6. Heater, Immersion, for Corrugated Cans

a. Description. The body of the liquid-fuel-fired immersion heater for corrugated cans (FSN 4540-266-6835, a new production model) is of watertight, sheet-steel construction and consists of a doughnut-shaped combustion chamber and a stack assembly which are welded together. Figure 66 shows the flow of air through the burner compartment, around the combustion chamber, and out through the flue compartment. A fuel tank is attached to the stack assembly. The heater is attached to a corrugated can by means of a modified hanger (fig. 67) which has been bent to fit the rim of the can. An instruction plate is located on the hinged burner hood which covers the top of the burner compartment. Four 2-foot sectional air conditioning pipes (stovepipes) are attached to the collar of the flue compartment. The modified standard model is similar in shape and size to this model. For complete descriptions of heaters and operating instructions, see TM 10-4540-201-15.

b. Use. The immersion heater for corrugated cans is used to heat water for messkit laundries (fig. 45).

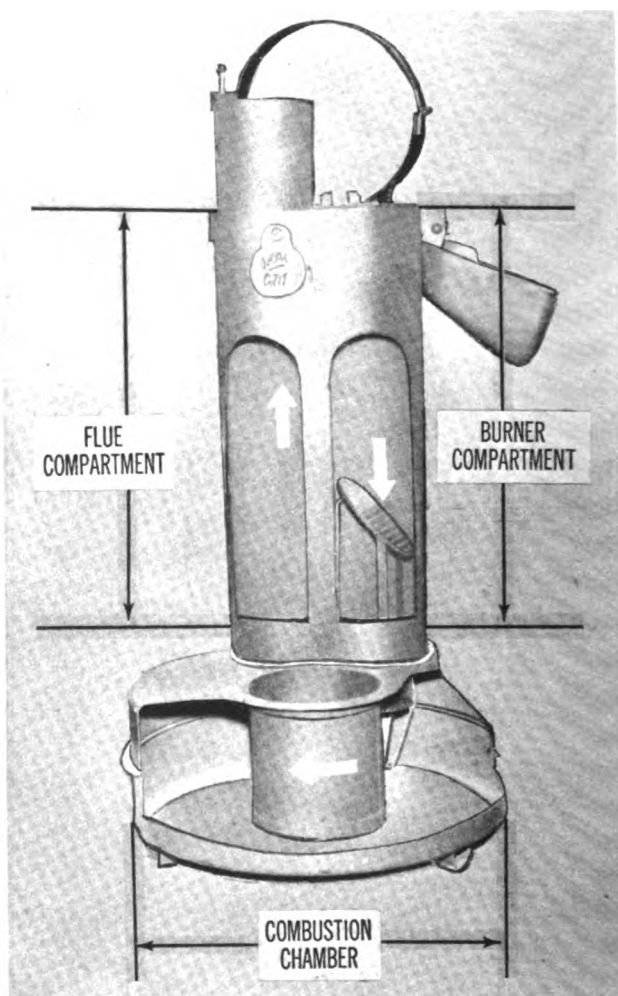


Figure 66. Cutaway model of immersion heater for corrugated cans.

c. General Hints and Precautions.

- (1) Keep a fire extinguisher close to the equipment.
- (2) Select a site for the can that is level and as sheltered as possible.
- (3) Pipe exhaust fumes outside before operating the heater within an enclosure.
- (4) Wipe up all spilled fuel and be sure that the fuel valve end of the fuel tank is free of fuel and dry. Before lighting the burner, be sure that there is no fuel in the combustion chamber of the heater.
- (5) Never operate the can heater unless the water level is at least 3 inches above the top of the combustion chamber. Fill the can with water to a point

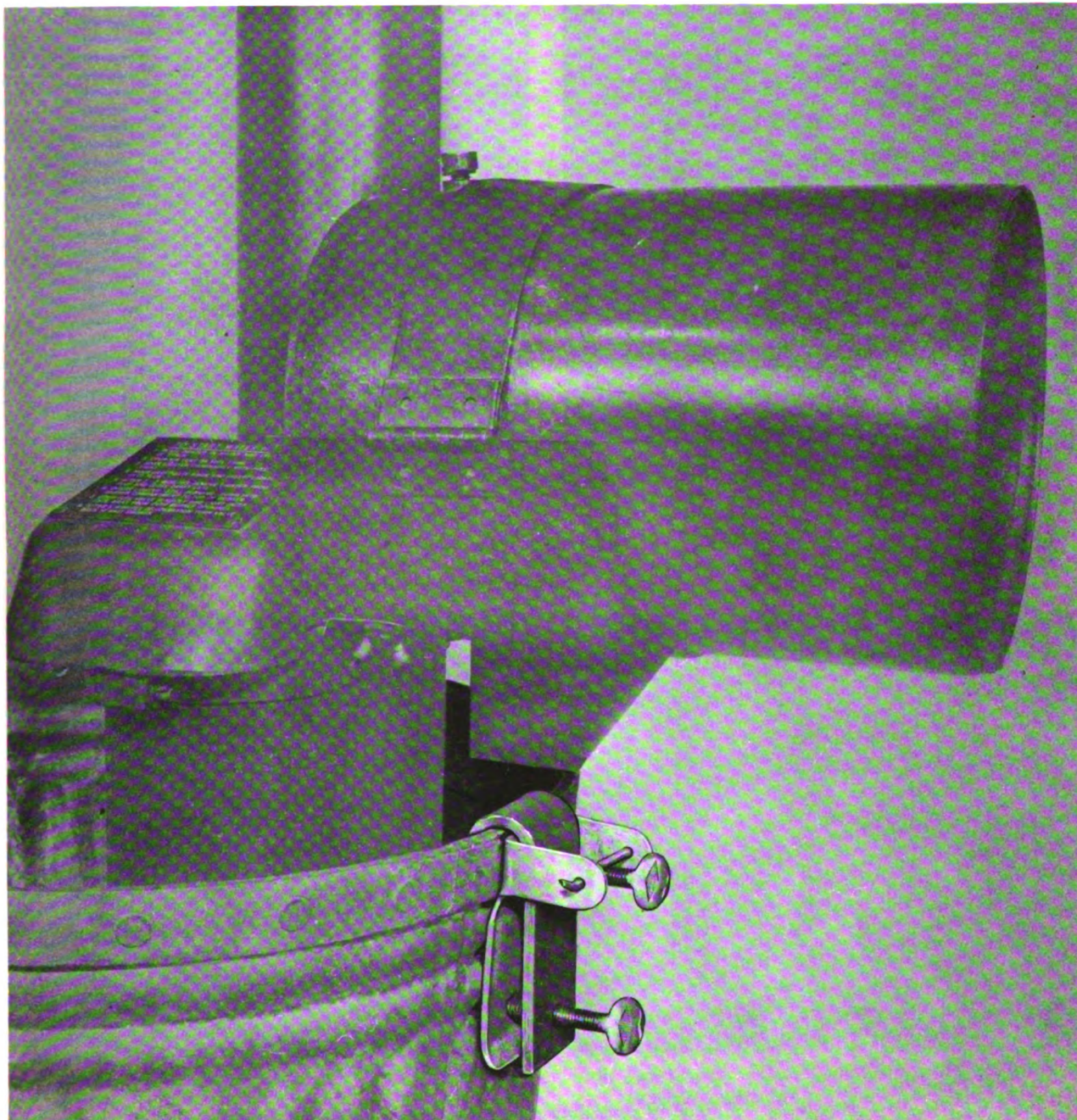


Figure 67. Modified hanger for attaching immersion heater to can.

- within 6 inches beneath collar assembly of heater.
- (6) Use two lighters when lighting the heater. Use one lighter to preheat the flue compartment; use the other lighter to light the burner compartment. Keep both lighters in place until their flames burn out. Keep face away from heater when lighting burner.
 - (7) Never hold lighters under fuel valve to saturate them with fuel.
 - (8) Wearing a glove on the hand, adjust the flow from the fuel valve to a fast drip; never let fuel flow in a continuous stream. Be sure that the heater is level at all times so that the fuel drops hit on the center of the vaporizer plate. If the fuel tank cradle, strap



1. Loosen wingnut and remove clevis pin.



2. Remove pin from opposite side of crossbar.



3. Remove crossbar.



4. Remove water tank cover.

Figure 68. Method of installing immersion heater in trailer tank.

assembly, or hanger is defective, keep the heater level by inserting a clean brick, block of wood, or any other suitable material of the proper size between the front of the doughnut-shaped combustion chamber and the inside wall of the can at the bottom.

- (9) Do not use solder to mend any part of the heater except the fuel tank.
- (10) Although other liquid fuels may be used, regular gasoline should be used

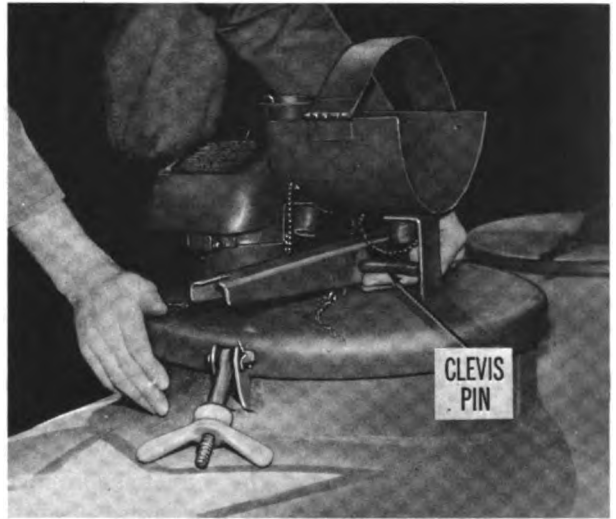
whenever possible because it burns cleaner and causes less smoke. Smoke may reveal your position to the enemy.

7. Heater, Immersion, for Tank Trailers

a. Description. The liquid-fuel-fired immersion heater for tank trailers (FSN 4540-266-6834, a new production model) is identical in construction to the new production model of immersion heater for corrugated cans described above, except that the heater for tank trailers



5. Place heater in tank opening; make sure that clevis on heater is in line with wingnut on tank.



6. Replace crossbar and clevis pin.



7. Replace pin at other side of crossbar.



8. Tighten wingnut. Heater is not ready for operation until air conditioning/heating pipe and fuel tank have been installed.

Figure 68—Continued.

has a 17 5/16-inch cover and a fuel tank cradle. The modified standard model heater for tank trailers is similar to the new production model. The heater is installed in the tank opening of the trailer tank as shown in figure 68. For complete descriptions of the immersion heaters for tank trailers and operating instructions, see TM 10-4540-201-15.

b. Use. The immersion heater for tank

trailers is used in field messing areas to prevent water from freezing in the tank. It does not heat the water to the boiling point.

c. General Hints and Precautions.

- (1) Keep a fire extinguisher close to the equipment.
- (2) Select a site for the tank trailer that is level and as sheltered as possible.
- (3) Wipe up all spilled fuel and be sure

that the fuel valve end of the fuel tank is free of fuel and dry. Before lighting the burner, be sure that there is no fuel in the combustion chamber of the heater.

- (4) Never operate the tank trailer unless the water level is at least 3 inches above the top of the combustion chamber. Fill the tank with water to a point within 6 inches beneath collar assembly of heater.
- (5) Use two lighters when lighting the heater. Use one lighter to preheat the flue compartment; use the other lighter to light the burner compartment. Keep both lighters in place until their flames burn out. Keep face away from heater when lighting burner.
- (6) Never hold lighters under fuel valve in order to saturate them with fuel.
- (7) Wearing a glove on the hand, adjust the flow from the fuel valve to a fast drip; never let fuel flow in a continuous stream. Be sure that the heater is level at all times so that the fuel drops hit on the center of the vaporizer plate.
- (8) Do not use solder to mend any part of the heater except the fuel tank.
- (9) Although other liquid fuels may be used, regular gasoline should be used whenever possible because it burns cleaner and causes less smoke. Smoke may reveal your position to the enemy.

APPENDIX D

FIELD EXPEDIENTS

1. General

This appendix contains directions for the construction and use of various field expedients which may be used temporarily to replace lost, damaged, or destroyed field mess equipment.

2. Improvised Cooking and Water-Heating Containers

a. A 55-gallon oil drum that has been cut in half horizontally (A, fig. 69) can be used for cooking and for heating water. Each half will hold approximately 25 gallons. The drum halves must be scoured inside and out to remove any impurities. It is not advisable to use the top half for cooking because the plug and threads in the top of the drum are difficult to clean.

b. A 55-gallon oil drum that has been cut in half vertically (B) can be used in the utensil washing and sterilizing unit (para. 9).

c. Smaller cooking containers can be made from 14-quart buckets (C). Galvanized pails or buckets are acceptable for cooking; however, food, once it has been cooked, should not be allowed to stand in galvanized containers. Four buckets will be needed for 100 persons.

d. The 5-gallon square lard can (D) or a can of similar size can be used if a wire handle is added. Cut wire of desired length; then punch holes in two opposite sides of the can, run one end of the wire through each hole, and fasten the wire securely. If baling wire or wire of similar gauge is used for the handle, it is suggested that a wooden handle be added. The wood will add rigidity to the wire and will provide an insulated grip. Select a smooth piece of wood of the desired size, cut a groove in the wood, place the wire along the bottom of the groove, and drive small nails through the wood and groove to secure the wire. Two of these cans are needed for 100 persons.

3. Combination Water-Heating and Cooking Facility

The combination water-heating and cooking facility may be used for boiling the water that is used by persons entering the serving line for rinsing and heating their eating utensils. It may also be used as a cooking vessel or container for heating water for hot drinks. Two of these field expedients are required for 100 persons; 6, for 500 persons.

a. Materials Required.

- (1) Twelve bricks.
- (2) Half of a 55-gallon oil drum or other suitable container.
- (3) One 2- by 10-foot piece of sheet metal.
- (4) Mortar made from grass, water, dirt, and gravel.

b. *Construction and Operation.* Construct combination water-heating and cooking facility as shown in figure 70. Build a coal or wood fire in the center of the square and place drum on brick stacks. Adjust position of shield until opening is facing wind. The ends of the shield should be about 6 inches apart.

4. Crossfire Trench

The crossfire trench may be used to heat water for dipping, washing, and rinsing individual mess equipment. It is also used to provide fire for the cross-trench incinerator described in chapter 3. When used for heating water, 2 trenches will be needed for 100 persons; 6, for 500 persons.

a. Materials Required.

- (1) Three pieces of 12- by 18-inch sheet metal.
- (2) Ten or eleven pieces of scrap iron (pipes, angles, bars, or rods), each approximately 24 inches long.

b. *Construction and Operation.* Construct

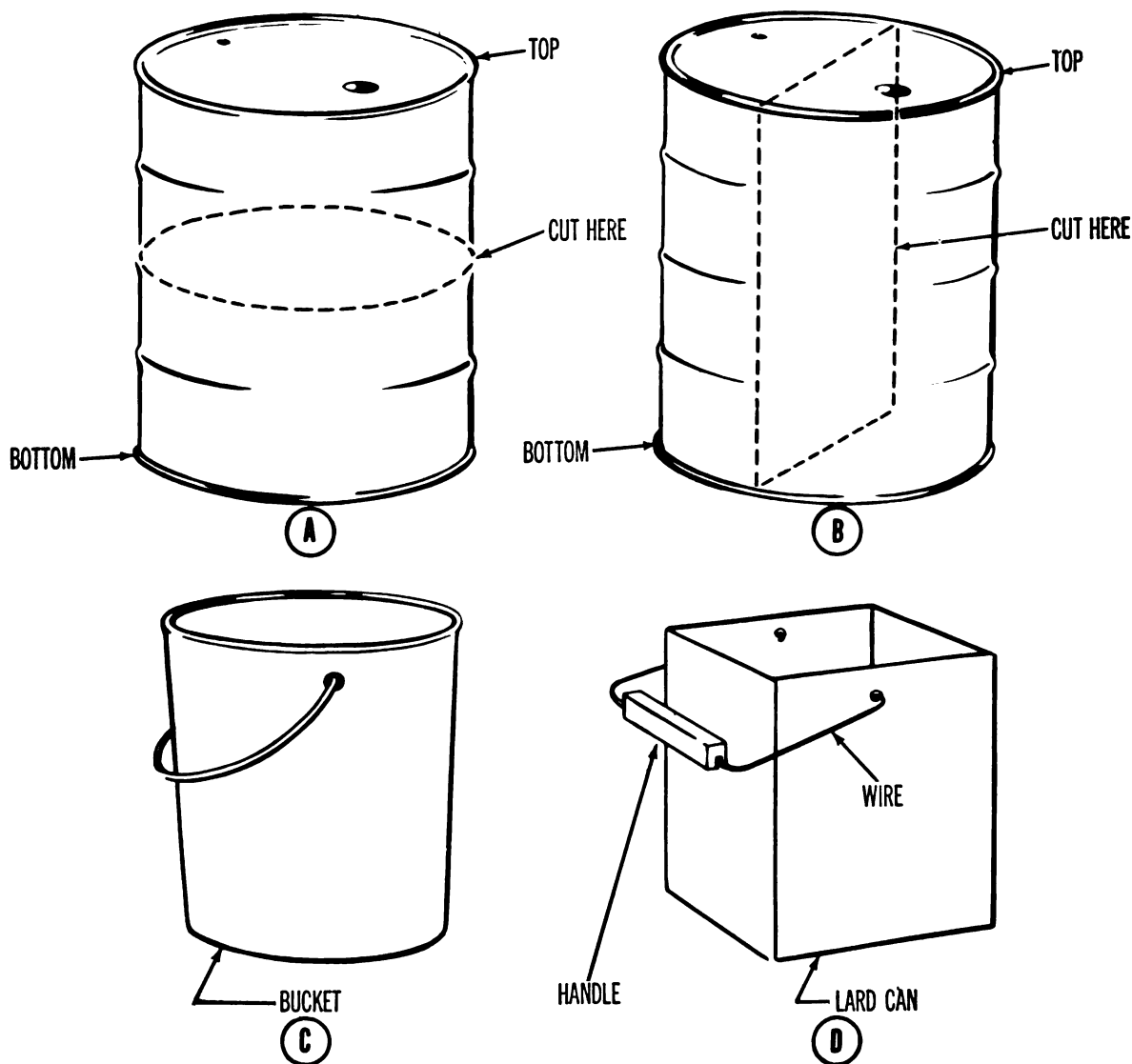


Figure 69. Improvised cooking and water-heating containers.

crossfire trench as shown in figure 71. Trenches should be 8 feet long, 1 foot wide, and 1 foot deep. Install draft blocks in trenches, leaving side facing wind open. Upper edges of draft blocks must not extend above the grill. Build fire under grill; place container on grill. If container gets too hot and food cooks too fast, shift container toward edge of grill to reduce temperature.

5. Griddle and Quick-Bread Oven

The griddle and quick-bread oven may be used as either a griddle or a quick-bread baking device. Two of these field expedients are needed for 100 persons; 6, for 500 persons.

a. Materials Required.

- (1) One steel plate, 30 inches square and $\frac{1}{8}$ inch to $\frac{1}{4}$ inch thick.
- (2) One steel plate, 30 inches square and $\frac{1}{4}$ inch to $\frac{3}{8}$ inch thick.
- (3) Two or more No. 10 cans with ends removed.
- (4) Two pieces of pipe, 30 inches long and $\frac{3}{4}$ inch to 1 inch in diameter.
- (5) Sand or dirt.

b. Construction. Using figure 72 as a guide, construct griddle and quick-bread oven as follows:

- (1) Dig a 2- by 2-foot pit, 1 foot deep. Dig

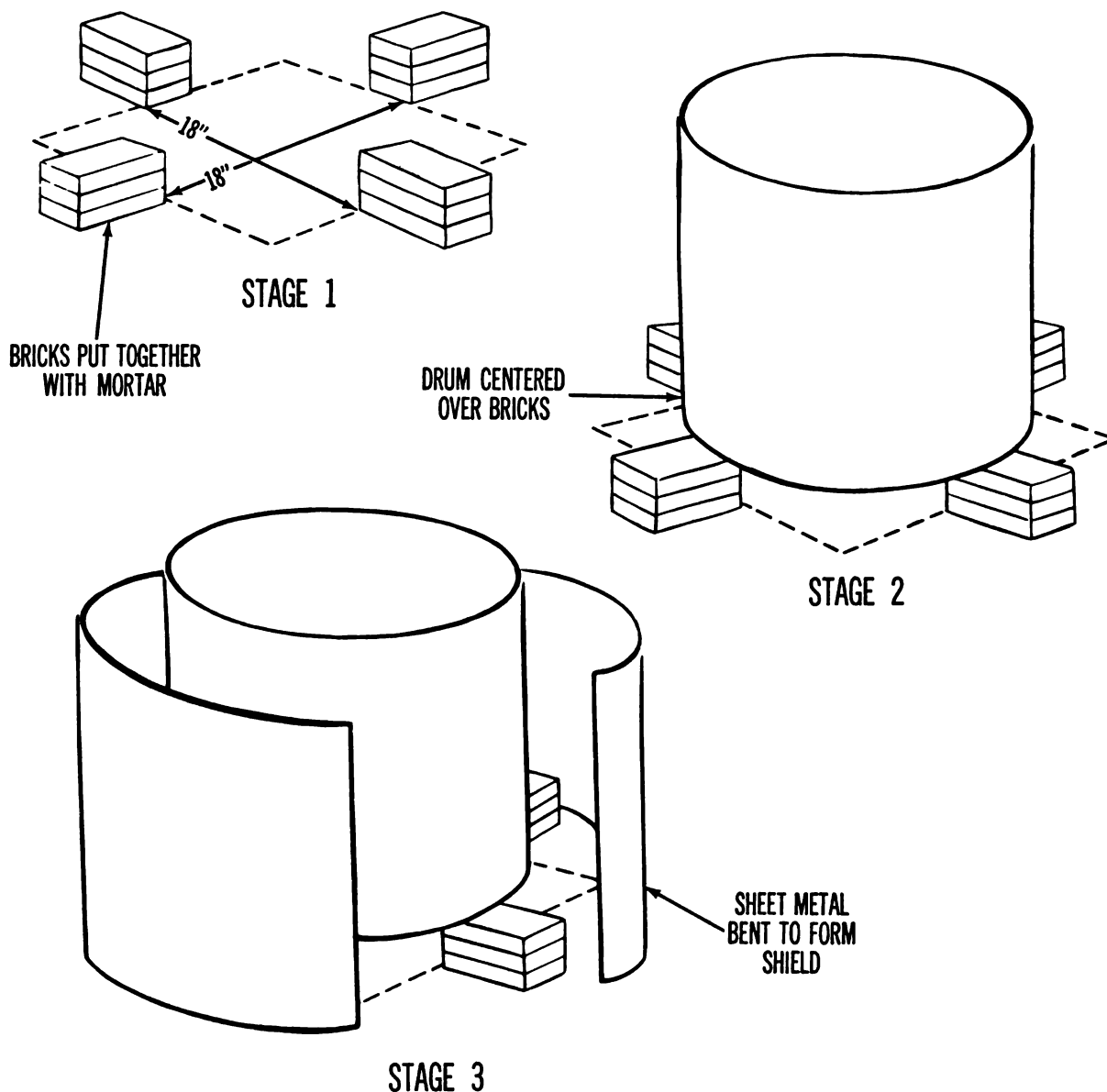


Figure 70. Combination water-heating and cooking facility, construction diagram.

- a tapered trench from one end of the pit to ground level.
- (2) At opposite end of pit, dig a 6-inch-square stack hole that connects with the fire pit (stage 1).
- (3) Place pipes, spaced 2 feet apart, across fire pit; then place thinner steel plate over the pipes, with one end along the vertical end of the pit.
- (4) Cover plate with 1 inch of sand or dirt.
- (5) Cover sand with thicker steel plate (stage 2).

- (6) Put No. 10 cans together to form a chimney; insert chimney in stack hole.
- (7) If material is in short supply, one sheet of steel, without sand, may be used; however, the sand and two steel plates make a more efficient heating unit.

c. Operation. Build a coal or wood fire in the pit. Place a piece of sheet metal, if one is available, at the front end of the trench for a draft plate. Grease the griddle before using. When baking quick bread, put dough pieces on greased

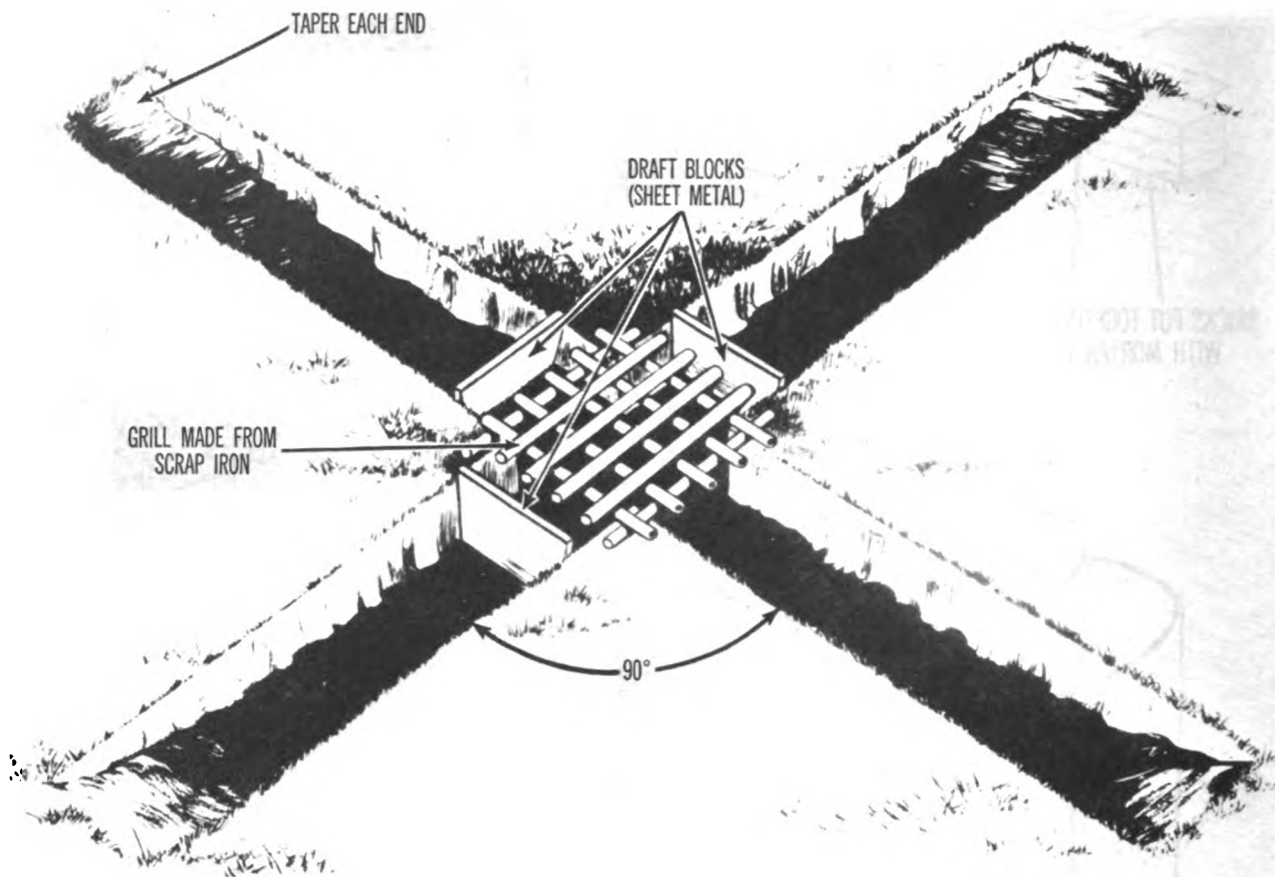


Figure 71. Crossfire trench.

griddle and cover each piece with an empty tin can.

6. Utensil-Washing Facility

This simple utensil-washing facility consists of three drums filled with water. The water in the first drum contains soap; it is hot but not boiling and is used for washing individual mess equipment. Long-handled brushes should be provided for scrubbing the equipment. The second and third drums are used for rinsing and sterilizing, respectively, and contain boiling water.

a. Materials Required.

- (1) Three oil drums or containers of similar size.
- (2) Sufficient pieces of 18-inch scrap pipe to make three grates for support of the drums.

b. Construction and Operation. Dig a slit trench, 1 foot wide, 1 foot deep, and about 18 feet long. Place grates across the trench, spacing the grates so that the drums, when placed on the grates, will be about 3 feet apart. Build fires under the second and third drums and bring water to a boil. Rake sufficient coals under the first drums to heat the water.

7. Work and Serving Surface

A work and serving surface (fig. 73) may be made from a sturdy table or bench, an even-surfaced door, or any other smooth clean wooden surface adaptable to this use. The working surface is held in place on the support frame by two runners that are attached to its underside. The runners permit removal of the working surface when it is needed for use in other parts of the area. The support frame should be about 3 feet high.

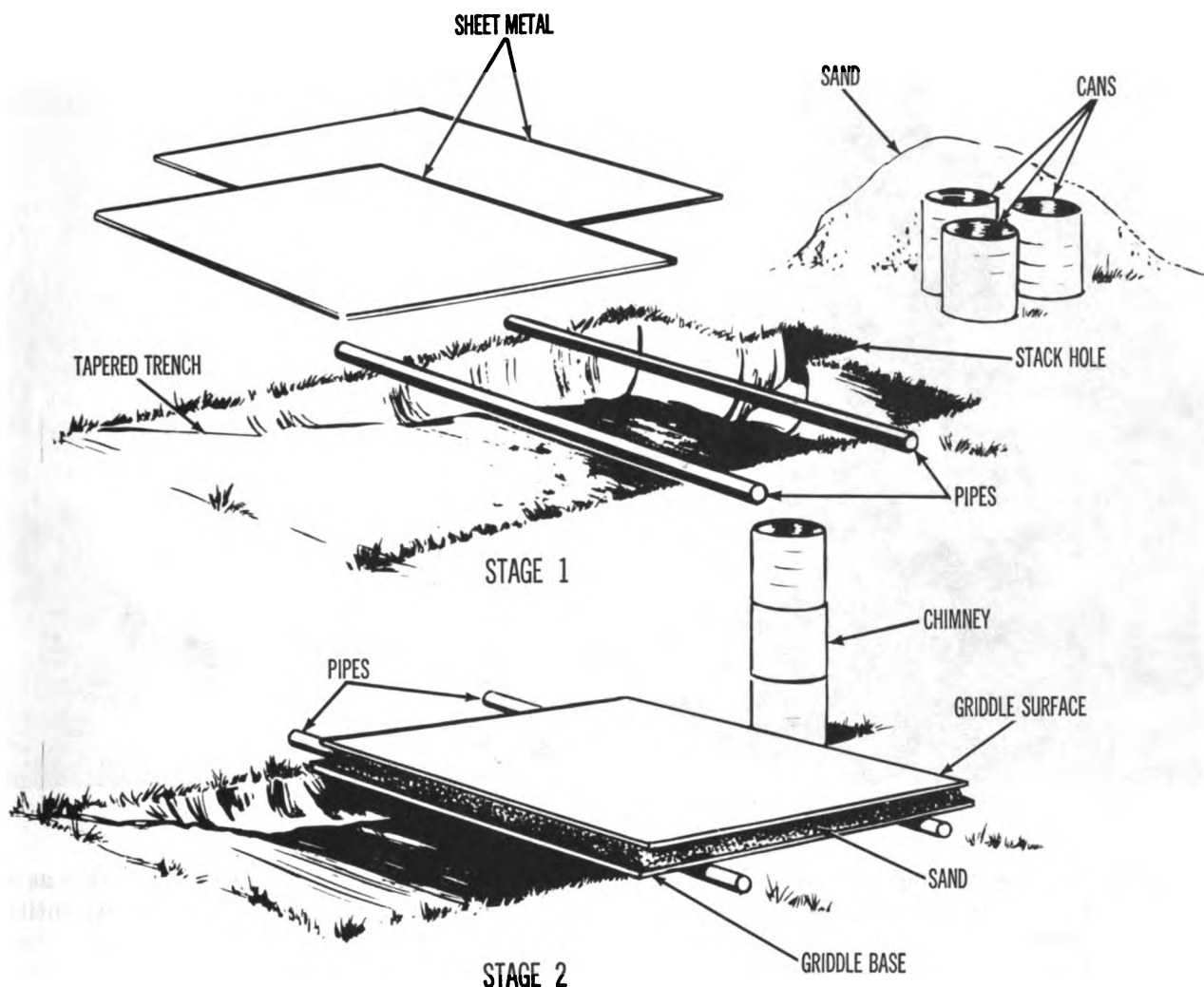


Figure 72. Griddle and quick-bread oven, construction details.

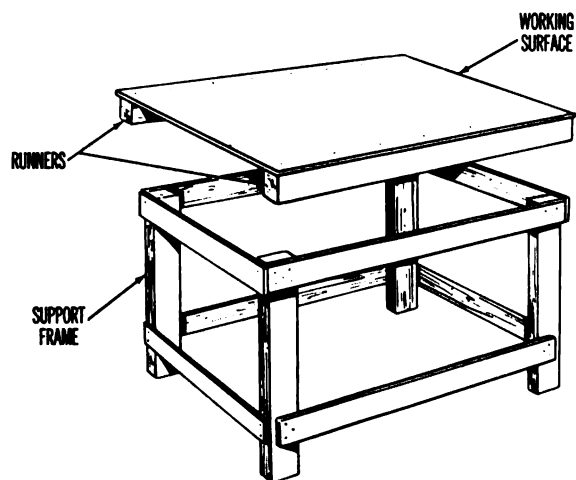


Figure 73. Work and serving surface.

8. Cross-Trench Barrel Oven

The cross-trench barrel oven may be used for roasting meats (fig. 74) or for baking bread. Two of these field expedients are required for 100 persons; 6, for 500 persons.

a. Materials Required.

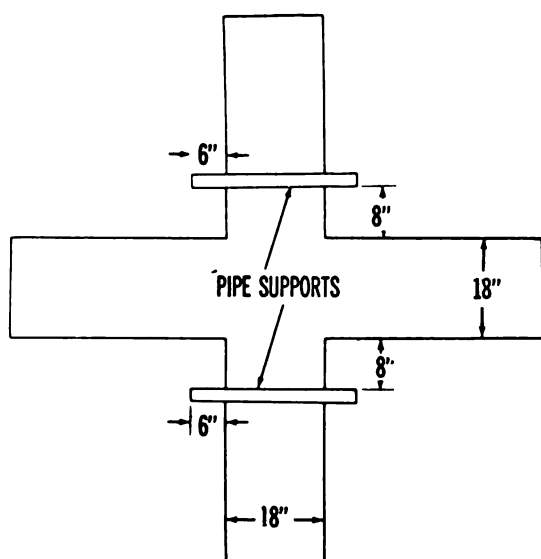
- (1) One 55-gallon oil drum.
- (2) Two pieces of pipe, 30 inches long and 1 inch to 2 inches in diameter, for supports.
- (3) One 20- by 40-inch steel plate, $\frac{1}{8}$ inch to $\frac{1}{4}$ inch thick.
- (4) Three 20- by 36-inch pieces of sheet metal.
- (5) One 24-inch-square piece of sheet metal.



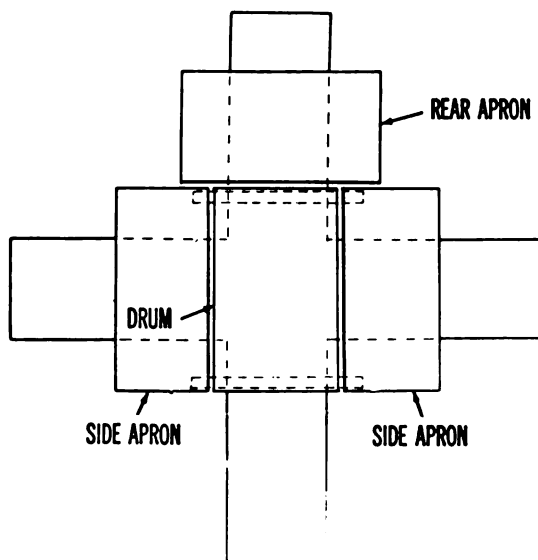
Figure 74. Cooking roasts in cross-trench barrel oven.

- (6) One piece of pipe, 15 inches long and 1 inch to 3 inches in diameter, for stack.
- (7) Leaves for airspace; straw or grass, sand or dirt, and water for mortar.
- b. Construction.* Using figure 75 as a guide, construct a cross-trench barrel oven as follows:
 - (1) Dig an 18-inch-wide crossfire trench.
 - (2) Position the 30-inch pipes across trench. (stage 1). Using a stick, mark positions of pipes on ground. Remove pipes and, using marks as a guide, dig two 4-inch-deep slots. Place pipes in slots.
 - (3) Position drum on pipe supports. Drum should rest on supports, with sides of drum about 1 inch beyond sides of trench at ground level.
 - (4) Position side and rear aprons so that they are about 1 inch out from sides and rear of drum (stage 2).
 - (5) Place steel plate (a(3) above) on one side apron so that plate is in a vertical position one-half inch away from one side of the drum and is resting on

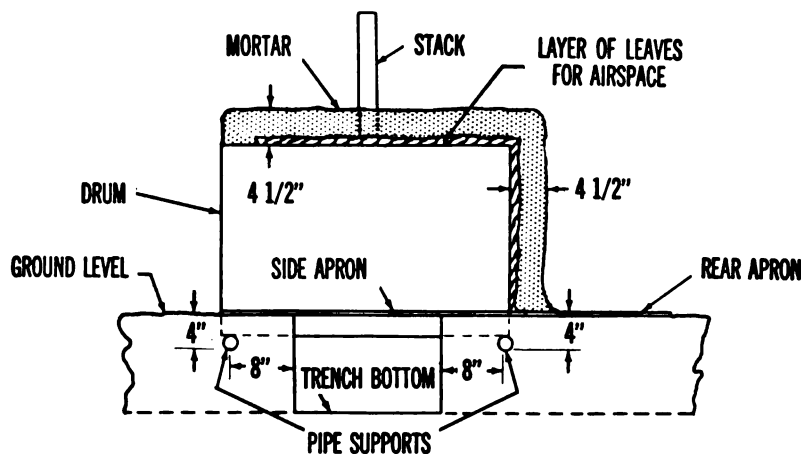
- its 40-inch side. Using steel plate as a guide, mark side apron along its entire length. Place a second mark 4 inches away from and parallel to the first mark.
- (6) Repeat procedure on other side of drum. Then mark a line 4½ inches away from rear of drum along entire length of rear apron.
- (7) Mix a mortar of dirt, grass or straw, and water.
- (8) Using lines on aprons as a guide, build side, front, and rear walls halfway up sides and rear of drum. Fill spaces between drum and walls with tightly packed leaves (stage 3). When side and rear walls are halfway up, there should be a clearance of about one-half inch between walls and drum. Front portion of side walls should be tight against the sides of the open end of the drum and should extend 4 inches toward rear of drum without provision for airspace.
- (9) Continue building front portion of



STAGE 1



STAGE 2



STAGE 3

Figure 75. Cross-trench barrel oven, construction details.

side walls until walls meet at the top of the drum. Build a 4-inch strip at rear of drum, with a $\frac{1}{2}$ -inch layer of leaves between rear wall of drum and mortar.

- (10) Build side walls up to top of drum and pack leaves into space provided. Leave a hole for the stack at the top center of the drum. The hole should be slightly smaller than the inside diameter of the stack.
- (11) Fill bottom of drum with a 6-inch layer of sand. Position shelf on sand

and shift shelf until it is level and its front end is flush with the open end of the drum.

c. Operation.

- (1) Build a fire in trench under barrel oven.
- (2) Block three trench arms, leaving arm facing wind open.
- (3) When oven is hot enough for baking, place food items on the shelf.
- (4) Cover opening with sheet-metal door and prop door to keep it tightly shut.

9. Utensil Washing and Sterilizing Unit

The utensil washing and sterilizing unit (fig. 76) is used by individuals to wash their eating utensils. One unit of this type will serve 500 persons.

a. Materials Required.

- (1) One 42- by 24-inch steel plate, $\frac{1}{8}$ inch to $\frac{1}{4}$ inch thick.
- (2) Two 55-gallon oil drums.
- (3) Four No. 10 cans for use as a stack.
- (4) One 21- by 35-inch piece of sheet metal for use as a firebox draft plate.
- (5) Two pieces of sheet metal, 35 inches long and wide enough to form heat baffles.
- (6) Bricks or stones as needed to form walls.
- (7) Dirt, water, and grass, straw, or hay for mortar.

b. Construction. Using figure 77 as a guide, construct utensil washing and sterilizing unit as follows:

- (1) Cut a 6-inch hole in the center of the steel plate.

- (2) Cut drums in half lengthwise.
- (3) Outline a 35-inch by 10-foot rectangle on the ground.
- (4) Using outline on ground as a guide, make an excavation 6 inches deep.
- (5) Wet the excavation floor. Mix a mortar of dirt, water, and grass, straw, or hay until it has the consistency of soft dough. Place a thick layer of mortar 8 inches wide along the inside edge of the excavation, leaving the firebox end open.
- (6) Lay alternate courses of bricks or stones and mortar along the mortar base until walls are level and 11 inches above the excavation floor. Place a layer of mortar along the sidewalls.
- (7) Position the first of the three half-drums across the sidewalls so that it is perpendicular to the sidewalls and about 3 inches in from the firebox end of the sidewalls. The ends of the half-drum should be flush with the outside faces of the sidewalls. Position the

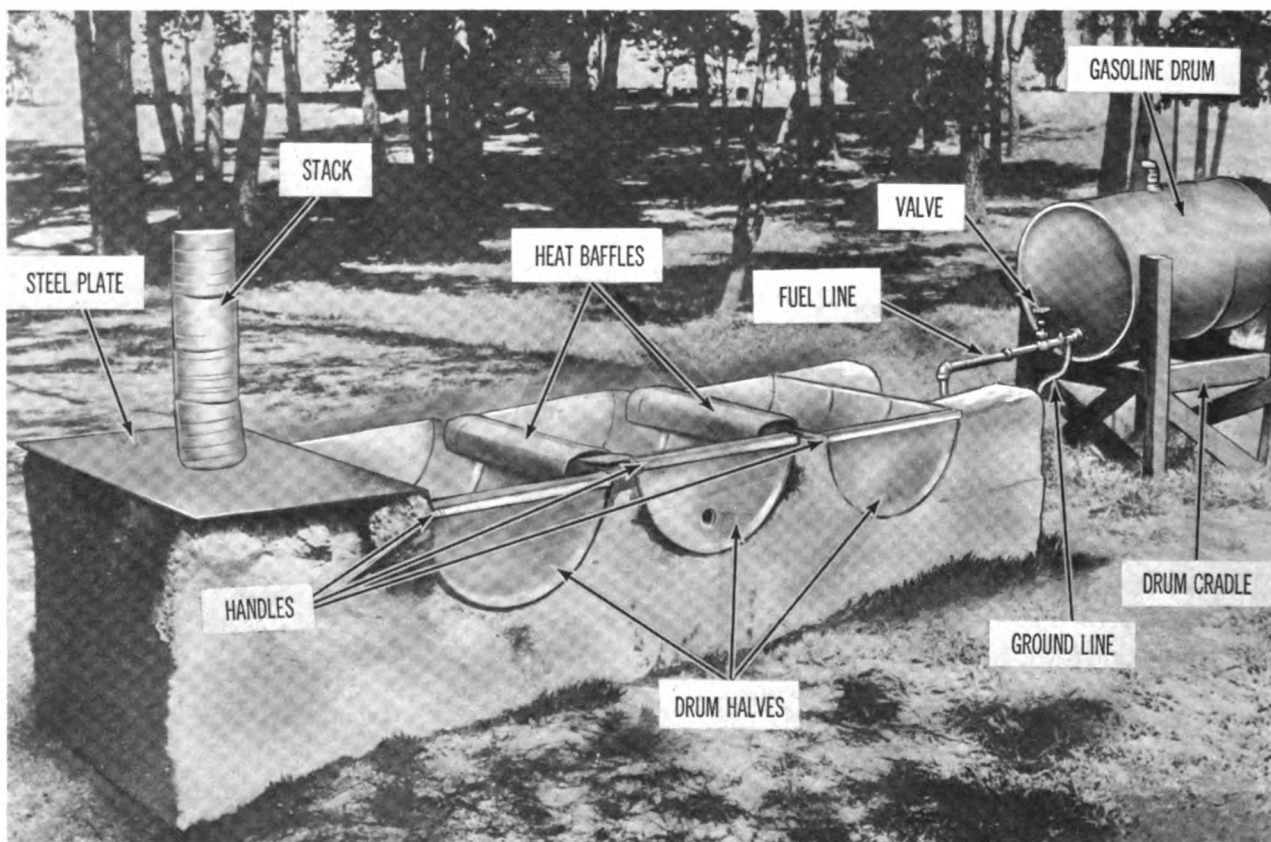


Figure 76. Utensil washing and sterilizing unit fired by trombone heater.

other half-drums in the same manner, leaving a space of about 3 inches between the tops of the half-drums. Pack a small amount of mortar between sidewall tops and half-drums to hold the half-drums in place.

- (8) Continue to lay walls, as close as possible to the half-drums, until the walls are 21 inches above the excavation floor. Pack mortar into the spaces around the half-drums to make a tight fit.
- (9) Join the No. 10 cans to form a stack. Place steel plate over walled end of structure. Insert stack in hole in plate center. For proper insulation, the plate may be covered with a 2-inch layer of mortar.
- (10) Cut sheet metal to form baffle plates. Baffle plates should be bent at the sides so that they will fit across the partitions between the drum halves (fig. 76).

solution until it simmers but do not allow it to boil. Fill the remaining half-drums with clear water; heat the water until it boils.

- (3) Place sheet metal draft plate against open end of unit. Move draft plate as desired to increase or decrease the draft.

10. Trombone Heater

The trombone heater may be used as a fire unit with either the washing and sterilizing unit (fig. 76) or the double-barrel oven.

a. Materials Required.

- (1) One 12-inch piece of $\frac{3}{4}$ -inch pipe for use as vertical pipe.
- (2) One 8-foot piece of $\frac{3}{4}$ -inch pipe for use as upper horizontal pipe.
- (3) One 6-foot piece of $\frac{3}{4}$ -inch pipe for use as lower horizontal pipe.
- (4) Three 6-inch pieces of $\frac{3}{4}$ -inch pipe, each piece with external threads at both ends.

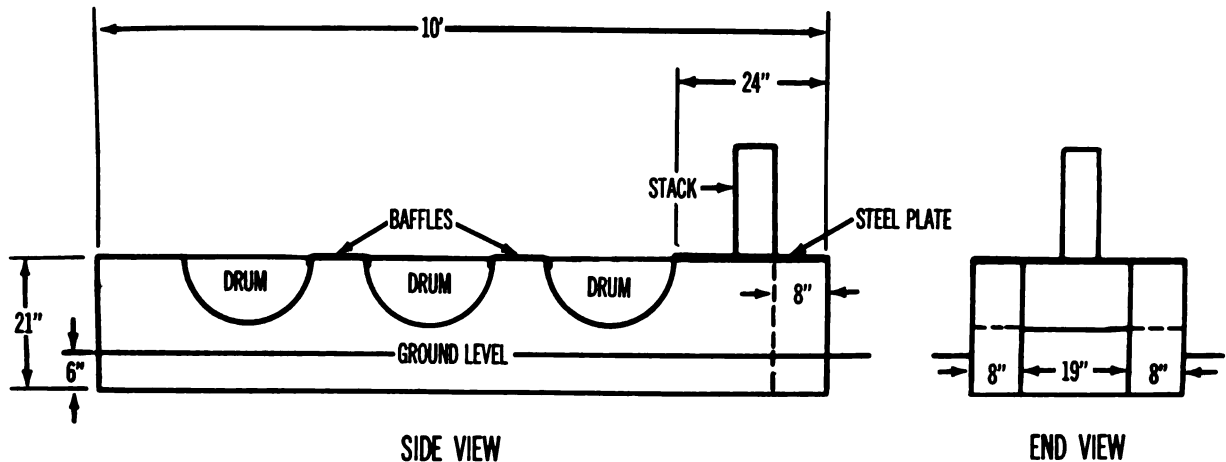


Figure 77. Utensil washing and sterilizing unit, construction details.

c. Operation. If unit is to be fired with a trombone heater (fig. 76), follow instructions in paragraph 10c and in (2) below. If unit is not to be fired with trombone heater, follow instructions below.

- (1) Remove half-drums. Build a coal or wood fire along the length of the unit. Replace drum halves when fire begins to burn steadily.
- (2) Fill half-drum at firebox end with water and soap or detergent. Heat this

- (5) Four $\frac{3}{4}$ -inch elbows and one $\frac{3}{4}$ -inch plug.
- (6) One valve, standard or improvised.
- (7) One metal gasoline container.
- (8) One piece of wire long enough for ground line.
- (9) Sufficient lumber or logs to construct a cradle for the gasoline container.

b. Construction. Using figure 78 as a guide, construct trombone heater as follows:

- (1) Construct cradle for gasoline drum.

- (2) Join pipes, elbows, and valve. Install plug on end of lower horizontal pipe.
- (3) Using a handdrill, drill 1/32-inch holes in top of lower horizontal pipe as shown in figure 78.
- (4) Wrap one bare end of the wire around the pipe between the valve and the gasoline container. Wrap opposite end of bare wire around a large nail or metal stake or rod. Drive nail, stake, or rod into the ground.

11. Griddle and Double-Barrel Oven

The griddle and double-barrel oven (fig. 79) provides a greater cooking capacity than the single-barrel oven, although the material requirement is nearly the same. One double-barrel oven is needed for 100 persons; 3, for 500 persons.

a. Materials Required.

- (1) Two 55-gallon oil drums, with one end removed from each. (Ends can be used as oven doors.)

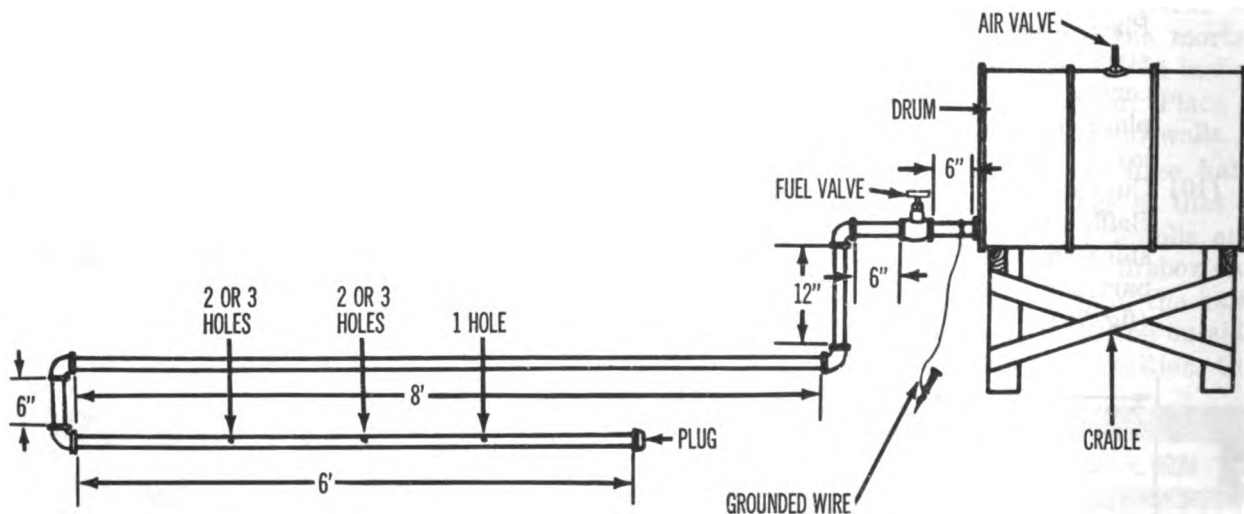


Figure 78. Trombone heater, construction details.

c. Operation.

- (1) Place assembled pipeline beneath double-barrel oven or washing and sterilizing unit. Seat gasoline container in cradle. Attach pipeline assembly end to gasoline container. Tip container slightly. Brace lower horizontal pipe with bricks or other material so that the weight of the pipeline assembly will be removed from the gasoline container end of the pipeline.
- (2) Open valve and allow gasoline to flow through pipe holes until bottom of excavation is wet; then close valve.
- (3) Ignite gasoline on excavation floor so that it will preheat the upper horizontal pipe. Once the upper horizontal pipe has been preheated, it will vaporize the gasoline that passes through it.
- (4) Turn valve on and adjust flame to desired height.
- (5) Two 33- by 20- by 3/8-inch steel plates for use as oven shelves.
- (6) Three No. 10 cans, with ends removed, for use as a stack.
- (7) One 78-inch by 39-inch steel plate, 1/8 inch to 1/4 inch thick, for use as oven top.
- (8) One 36-inch-square steel plate, 1/8 inch thick, for use as a griddle.
- (9) Two 39-inch by 2-inch by 1/2-inch iron or steel bars.
- (10) Bricks or stones as needed to form walls.
- (11) One 36-inch by 20-inch by 1/8-inch steel plate for use as a draft plate.
- (12) Sheet metal for baffle plates as required.
- (13) Sand or dirt for use as insulation in barrels.
- (14) Dirt, water, and grass, straw, or hay for mortar.

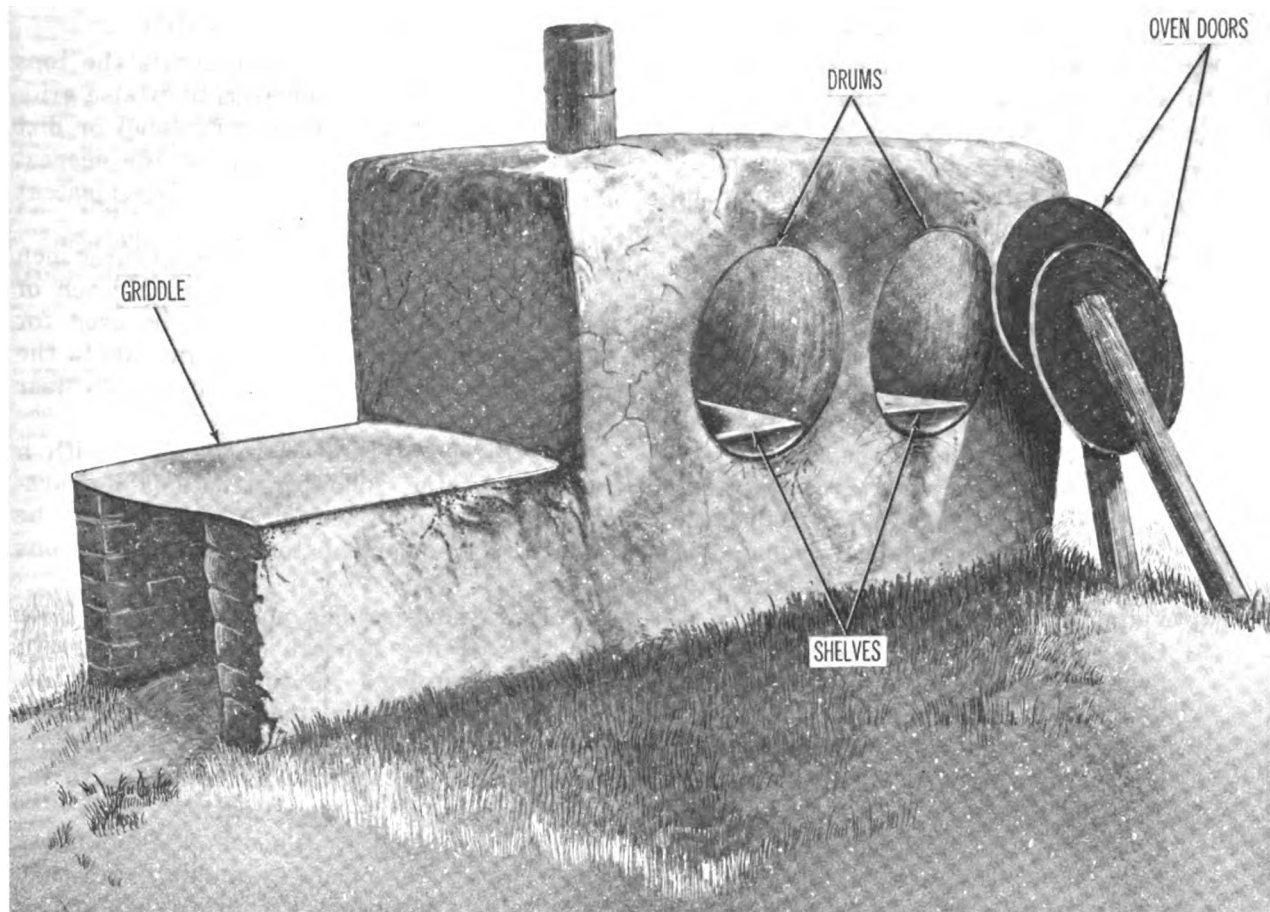


Figure 79. Griddle and double-barrel oven.

- (12) Two pieces of 2- by 4-inch lumber 36 inches long, for door props. Each piece should be beveled at one end.

b. Construction. Using figure 80 as a guide, construct double-barrel oven as follows:

- (1) Outline a rectangle, 3 feet 4 inches by 9 feet 6 inches, on flat ground. Using these lines as a guide, make an excavation 4 inches deep.
- (2) Wet the excavation floor. Mix a mortar consisting of dirt, water, and grass, straw, or hay to the consistency of soft dough. Place a thick layer of mortar 8 inches wide around the inside edge of the excavation. Leave a 2-foot opening at firebox end.
- (3) Lay brick or stone walls on the mortar base. Walls should be 8 inches wide and 2 feet high.
- (4) Place a thin course of mortar along top of sidewalls. Position one drum

across the sidewalls so that it is about 14 inches from the outside face of the end wall. The open end of the drum should be flush with the outside face of the front sidewall, and the closed end should be resting on the rear sidewall.

- (5) Place the second drum across the sidewalls so that it is parallel to the first drum. Drums must be at right angles to the sidewalls and 4 inches apart at both ends. Pack a small amount of mortar between the sidewalls and drums to hold the drums in place.
- (6) Place two steel or iron bars across the sidewalls so that the nearest bar is 36 inches from the end of the firebox wall. Bars should be about 4 inches apart.
- (7) Using bars as a base, lay a brick or stone end wall 8 inches wide and 16

inches high. Continue to lay walls until all walls are level and 4 feet above ground level. Lay sidewalls as close to drums as possible; then fill remaining space with mortar. Pack mortar into spaces so that the mortar will be snug against the drums around the entire circumference of the drums.

- (8) To increase the efficiency of the oven, add two baffle plates before installing the oven top. Position one plate between the barrel and the end wall nearest the griddle; the plate should extend from the top edge of the wall to the near surface of the barrel. Place the second baffle plate across the tops of the barrels. These plates will force the hot air to circulate around the barrels to reach the stack, thus providing more even heat in the ovens.
- (9) Cut a 6-inch hole in the center of the oven top, 11 inches in from one end. Position the oven top on the oven walls, with the hole toward the firebox end of the oven.
- (10) Join the No. 10 cans to form a stack. Insert the stack in the hole in the steel plate. Cover the steel plate with a 3-inch layer of mortar. Cover all exterior

surfaces of the oven with a thin layer of mortar.

- (11) Lay the square plate across the tops of the firebox sidewalls to make a griddle. Fill the drums with sand or dirt to a depth of 6 inches at the deepest point. Insert oven shelves (steel plates) in the drums.
- (12) Punch two or three holes about 1 inch apart across the diameter of each of the drum ends that will be used for oven doors. Nail the drum ends to the beveled ends of the 2- by 4-inch door props.

c. Operation. If unit is to be fired with a trombone heater, follow instructions in paragraph 10c and in (2) below. If unit is not to be fired with a trombone heater, follow instructions below.

- (1) Remove griddle and start a wood or coal fire beneath the drums and in the firebox. As soon as the fire has begun to burn steadily, place the draft plate against the end of the firebox. Move draft plate as necessary to increase or decrease draft.
- (2) Place food in the ovens. Prop doors over oven openings, making sure that the door props are firmly set in the

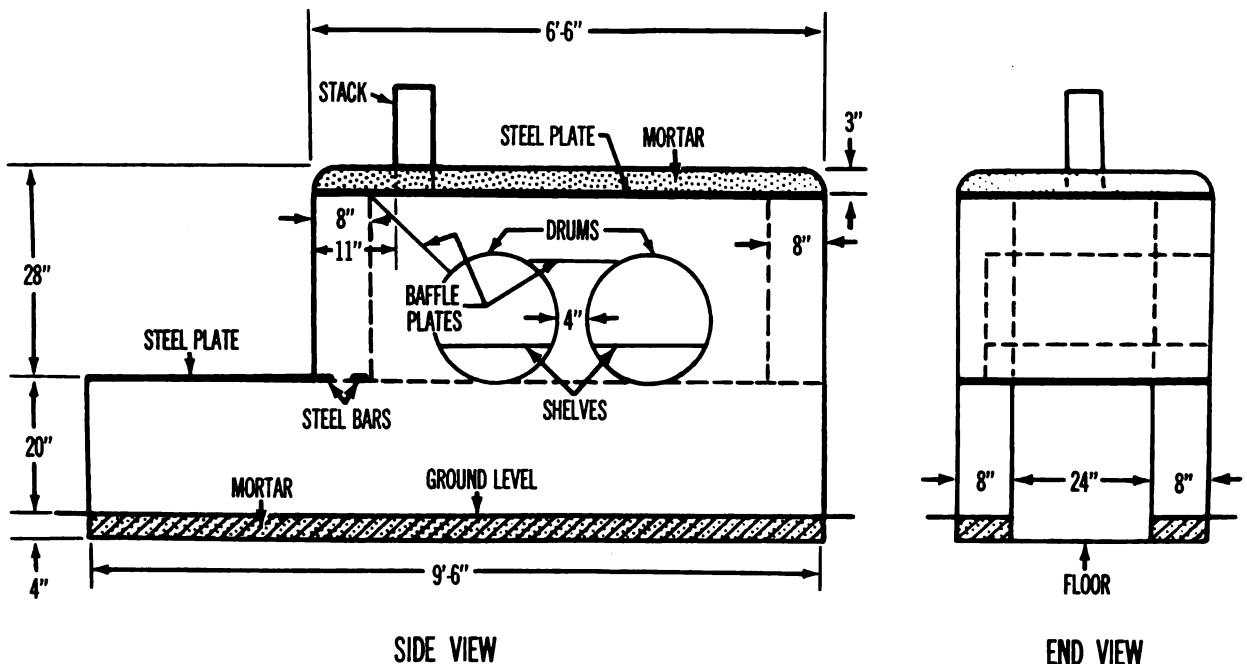


Figure 80. Griddle and double-barrel oven, construction details.

ground surface. Brace the props by driving stakes into the ground at the lower ends of the props. The stakes will provide a guide for positioning the oven doors each time they must be replaced.

12. Improved Cooking Utensils

Improved cooking utensils can be made from scrap metal and smooth wood. Tin cans

can be used extensively because of their availability. Most tin cans are made of rolled steel with a thin coating of tin or other alloys and should not be used if this protective coating has burned off. Other cans have a gold-colored enamel interior which should be removed by burning before the can is used. Figures 81 through 84 may be used as a guide for making various cooking and serving utensils.

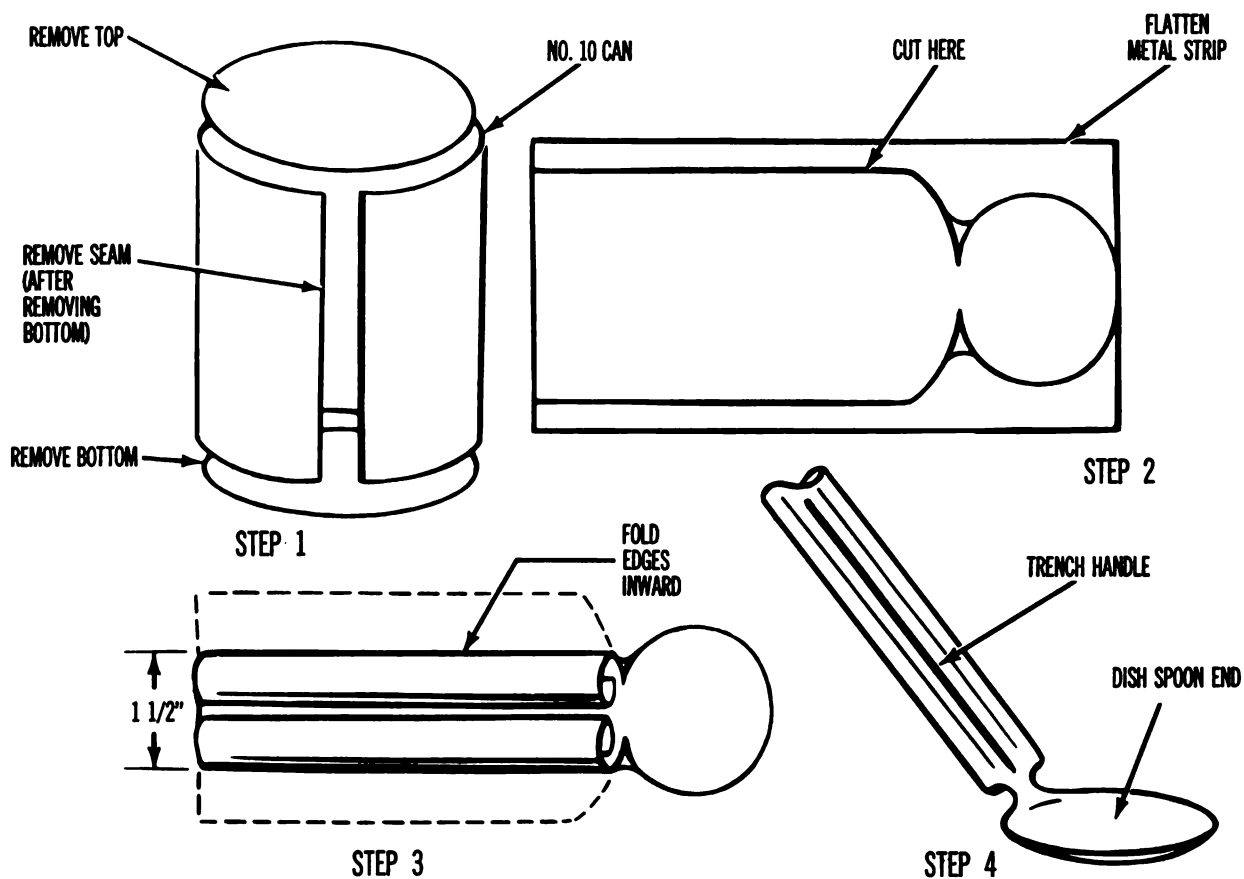
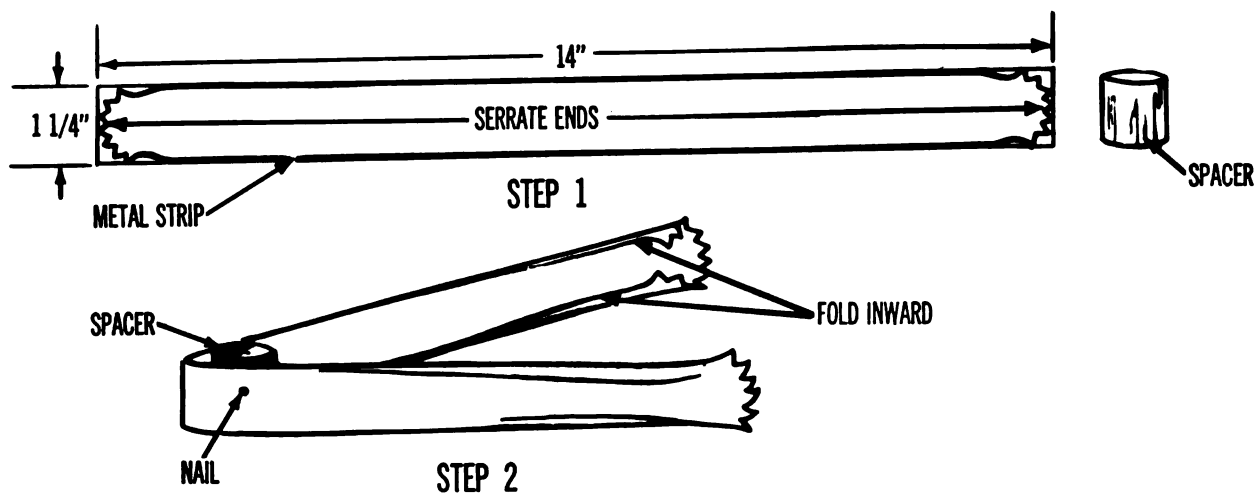


Figure 81. Cooking and serving spoon, fabrication details.



SERVING TONGS

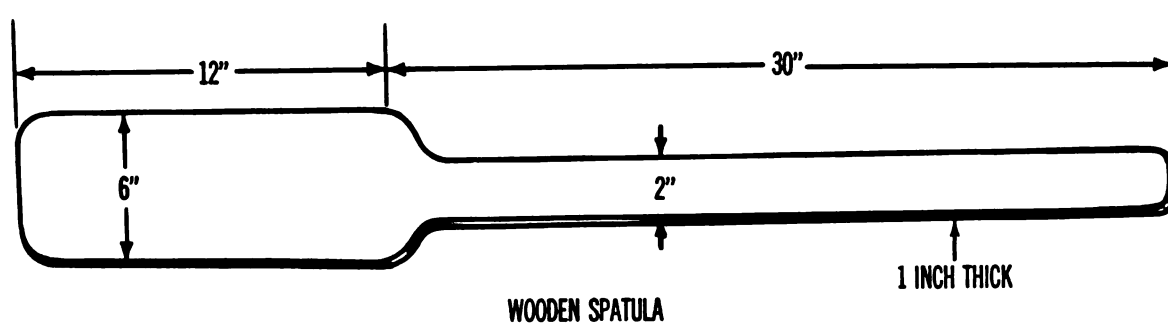
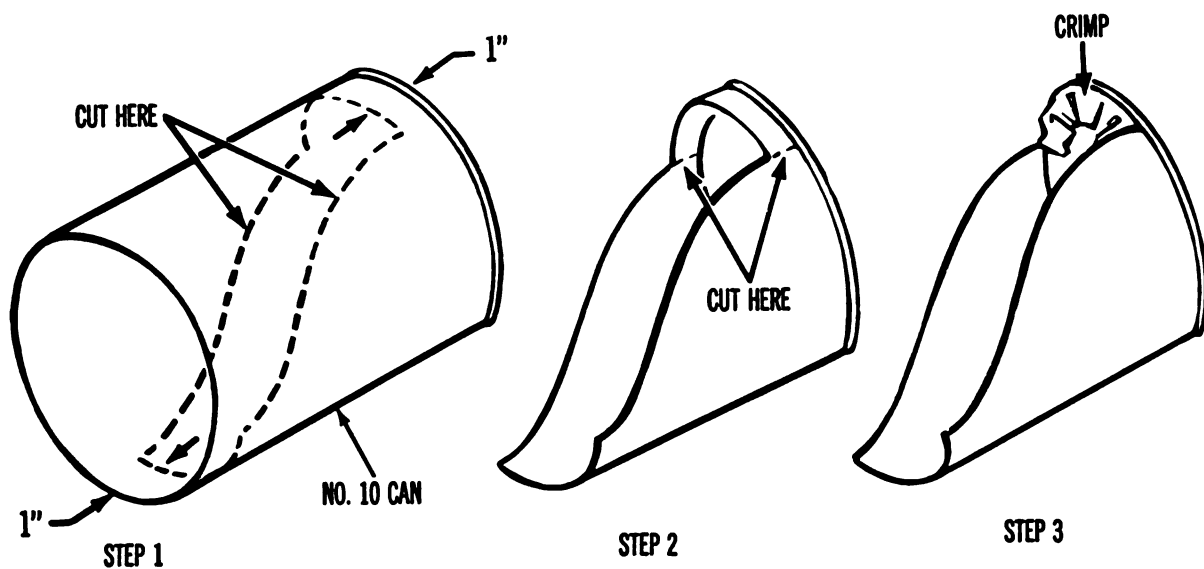
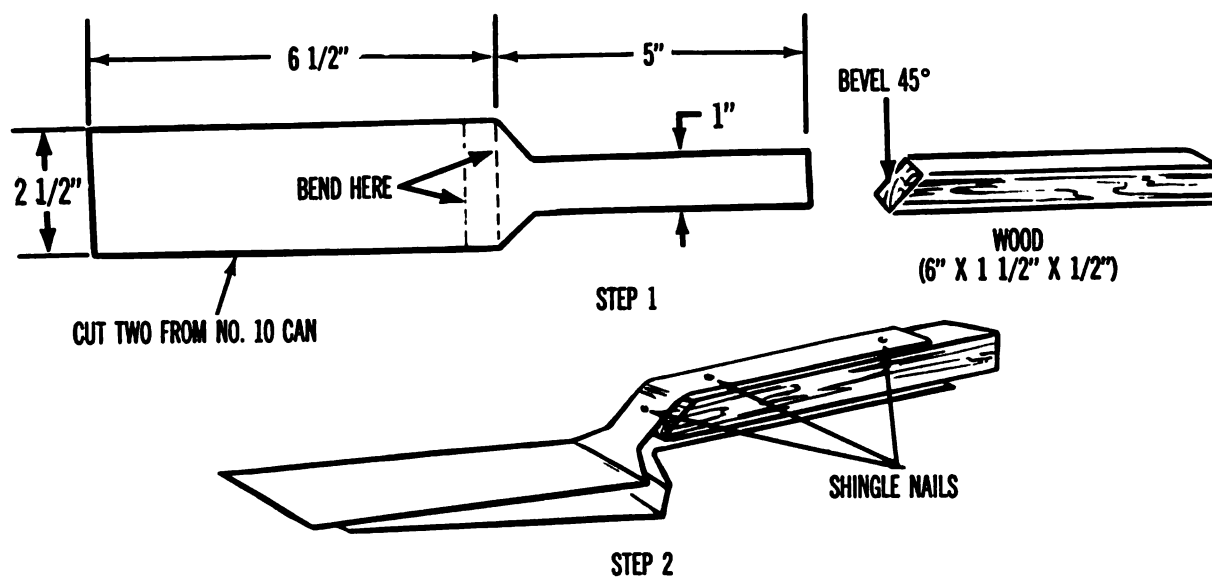


Figure 82. Serving tongs and wooden spatula, fabrication details.



SCOOP



SERVING SPATULA

Figure 83. Scoop and serving spatula, fabrication details.

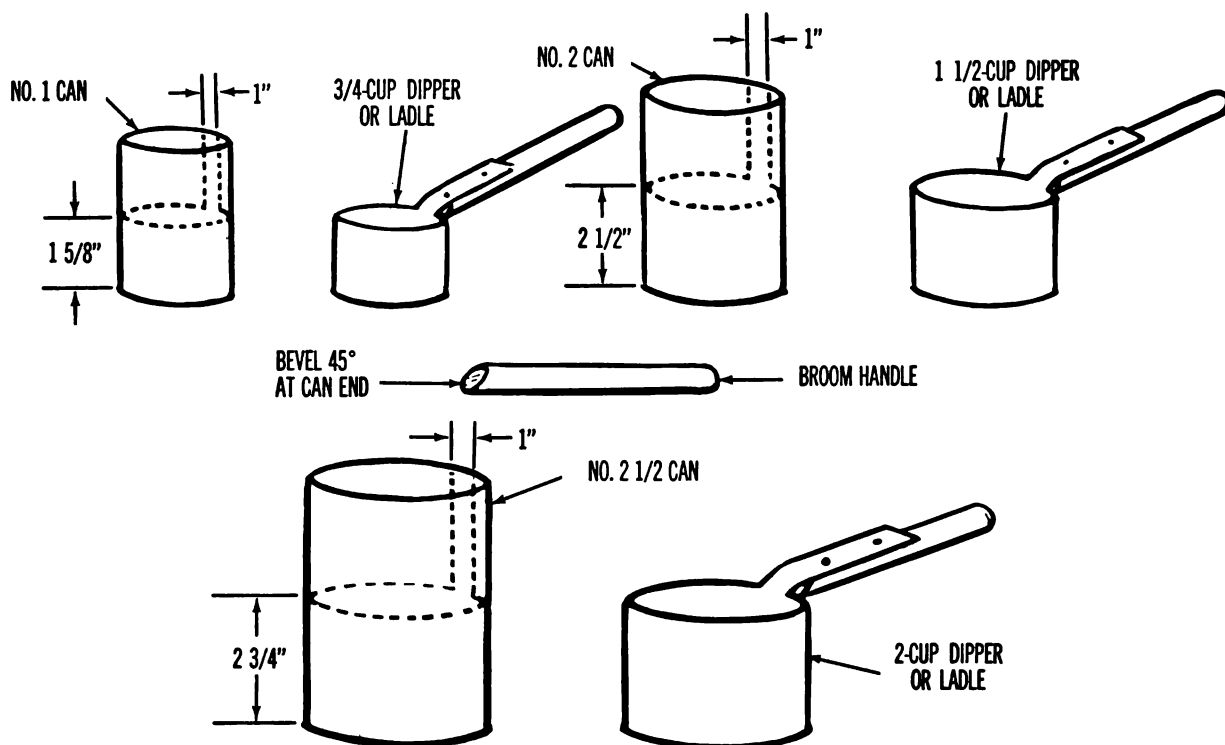


Figure 84. Dippers or ladles, fabrication details.

13. Improvised Eating Utensils

Should it be necessary to improve eating utensils, figures 85 and 86 may be used as a guide.

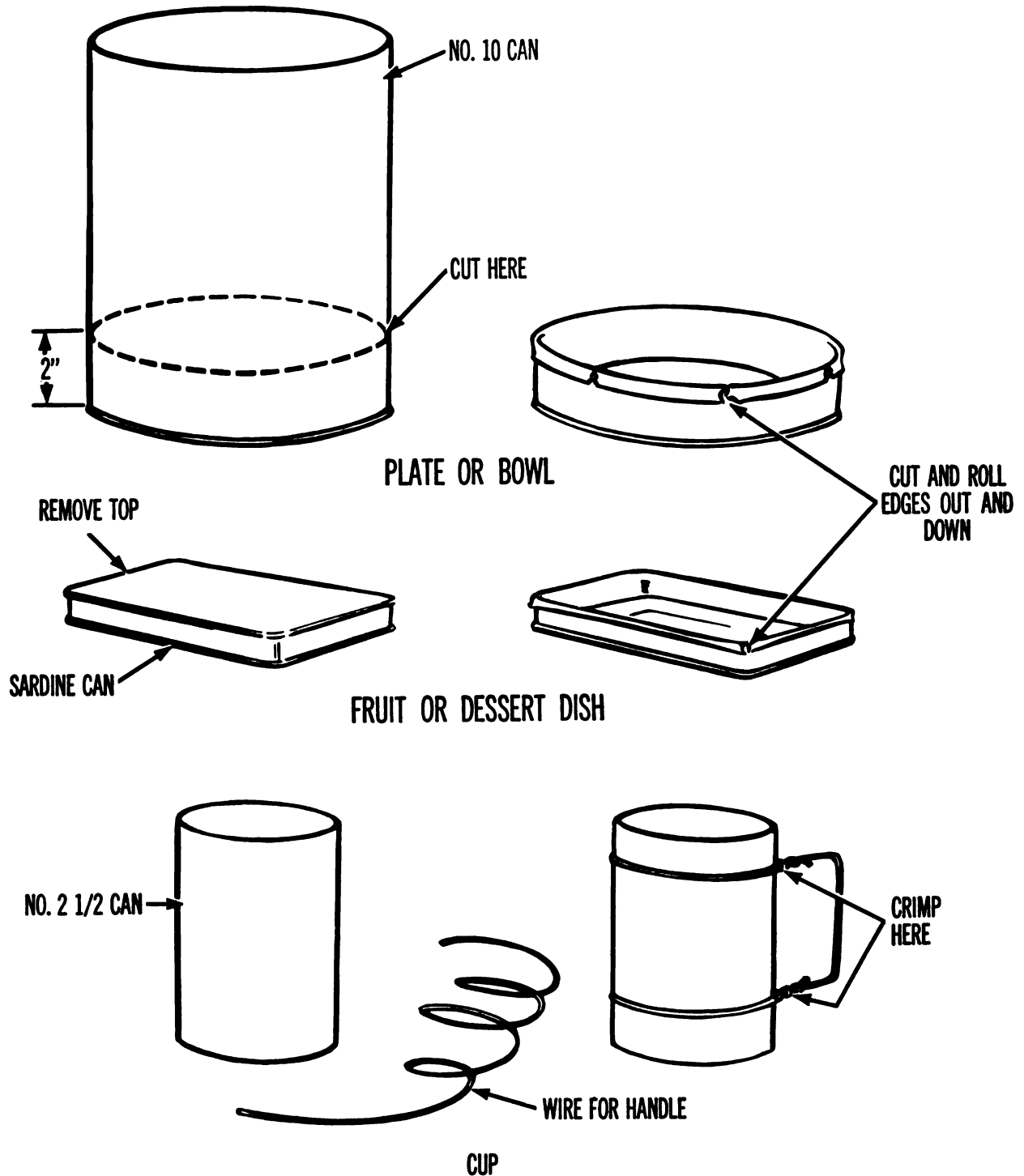


Figure 85. Plate or bowl, fruit or dessert dish, and cup, fabrication details.

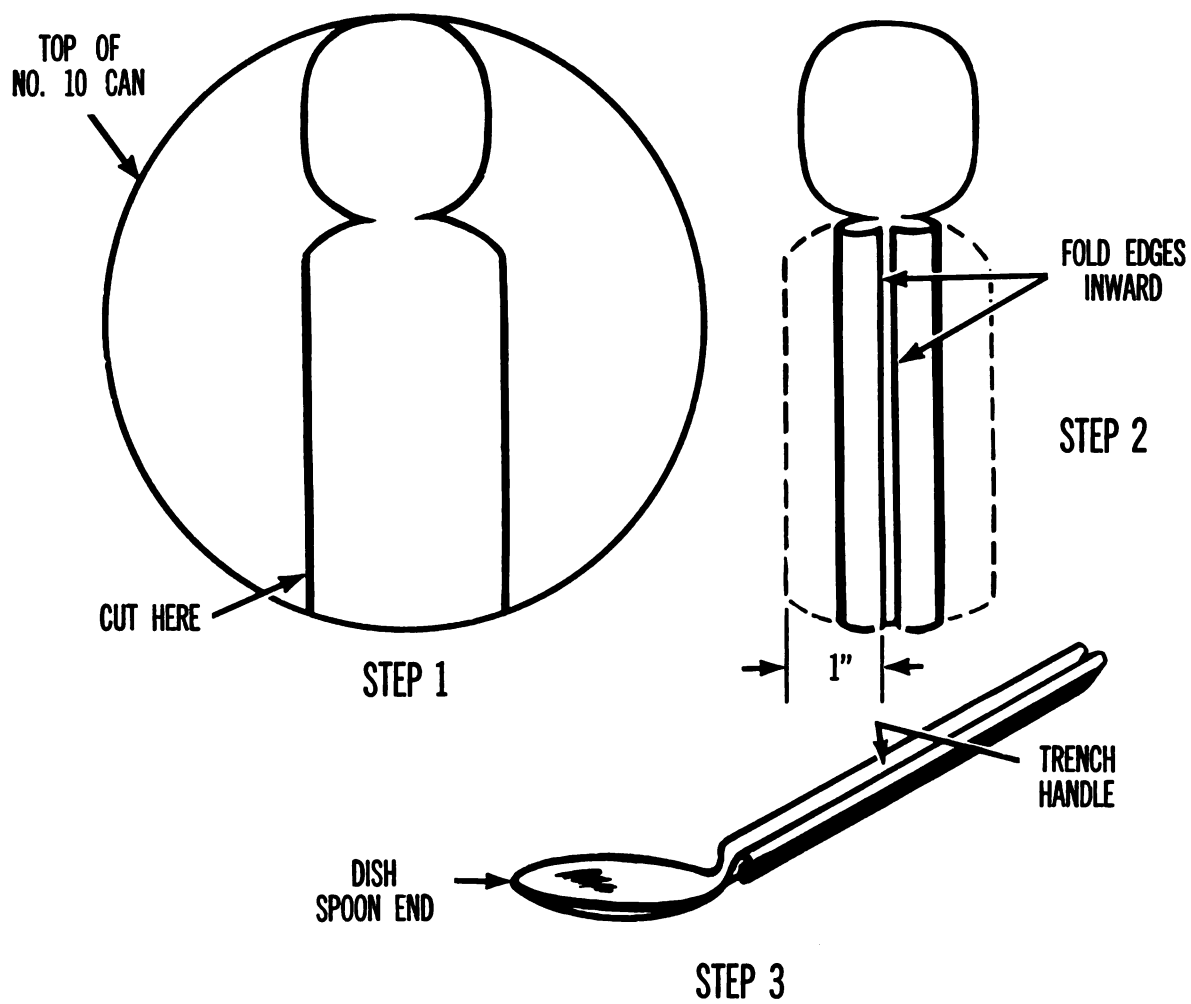


Figure 86. Individual spoon, fabrication details.

14. Improvised Lighting

Figures 87 and 88 illustrate methods of improvising lighting equipment. Lard, tallow, or wax may be used as solid fuel for the shallow-pan torch and the reflector lamp; shoe polish, furniture polish, and other wax-base products may be used as solid fuel for the canned-wax torch.

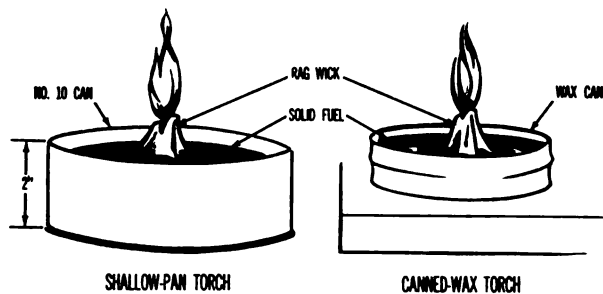


Figure 87. Shallow-pan and canned-wax torches, fabrication details.

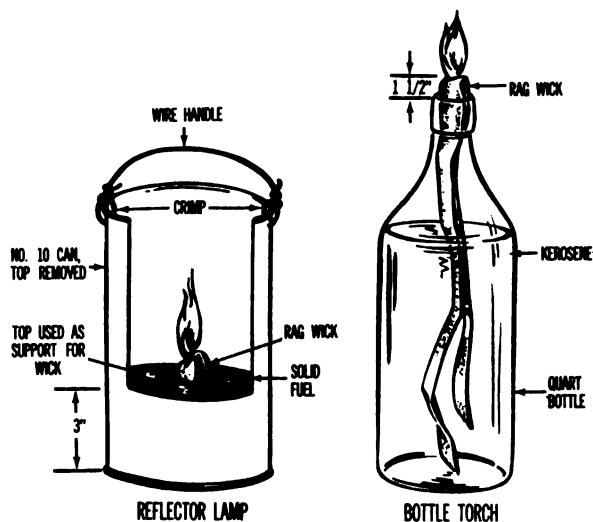


Figure 88. Reflector lamp and bottle torch, fabrication details.

INDEX

	Paragraph	Page		Paragraph	Page
Accessory equipment, kitchen truck	61	52	Cash Meal Payment Book (DD Form 1544):—Continued		
Accessory items:			Turn-in of book	32	19
Issue for troop train movements....	78	77	Turn-in of cash	32	19
Sources of supply, messes	25	13	Safeguarding of	31	17
Accessory outfit, gasoline field range	App. C	99	Cash meal payment sheets:		
Use in kitchen baggage cars	71	64	Use in kitchen cars	82	79
Use with kitchen trucks	61	52	Use in messes:		
Army food program	3	2	Accounting for	31	17
Assistant mess steward:			Maintenance of	31	17
Role of	16	9	Use for midnight meals	38	30
Shift assignment	36	27	Cleaning materials, storage of	22	10
"B" ration:			Cleaning procedures	42	33
Preparation on field cooking outfit, small detachment	App. C	99	(Also see dishwashing.)		
Use of	4	114	Commanders, responsibility in Army food program	3	2
Box lunches:			Commanding officer, responsibility in mess	13	7
Accounting for	30	15	Condiments:		
Entry on cooks' worksheet	26	14	Sources of supply	25	13
Use in rail movements	65,77	63,76	Storage of	34	22
Bread:			Condition inspection of subsistence	33	19
Delivery to messes	25	13	Cooking and water-heating containers, improvised	App. D	123
Supply for troop train movements..	77,80	76,79	Cooking, safety in	22	10
Buildings:			Cooking utensils, improvised	App. D	135
Inspection of	45	36	Cooks:		
Responsibilities of engineer	7	5	Duties of	17	9
Responsibilities of mess personnel..	7,8	5	Shift assignment	36	27
Security of	9	5	Cooks' helper:		
Camouflage, field messing	59	50	Duties of	18	9
Canned goods:			Shift assignment	36	27
Condition inspection	33	19	Training of	18	9
Storage of	34	22	Cooks' Worksheet:		
Cash Collection Voucher (DD Form 1131), use of	32,82	19,79	Disposition of leftovers	40	32
Cash for meals:			Review of, daily meeting	37	28
In kitchen cars	82	79	Use and preparation of	26	14
In messes:			Use for midnight meals	38	30
Accounting for	31	17	Use in preparing ration request....	25	13
Turn-in of cash	32	19	Cook's worktable, kitchen baggage cars:		
Cash Meal Payment Book (DD Form 1544):			Construction of	71	64
Drawing of	31	17	Positioning of	72	66
Number authorized	31	17			

	Paragraph	Page		Paragraph	Page
Cross-fire trench, construction and use of	App. D	123	Excess supplies:		
Cross-trench barrel oven, construction and use of	App. D	127	Disposition of	28,76	15,76
Daily meeting:			Storage of	34	22
Conduct of	37	28	Feeding of mess personnel	38	30
Participating personnel	37	28	Feeding of railroad employees, troop movements	77	76
Dehydrated foods:			Field cooking outfit, small detachment..	App. C	99
Use in arctic	97	87	Field expedients	57,58, App. D	46,50,123
Use in tropics	92	84	Field messes:		
Demonstrations, use in training personnel	48	39	Facilities	49	41
Dishwashing:			In rear areas	52	41
Hand dishwashing	App. B	95	Kitchen truck	61	52
Inspection of mess facilities	45	36	Types of field messes	49	41
Mechanical dishwashing	App. B	94	Field range accessory outfit	App. C	102
Messkit laundry	App. B	95	Field ranges	App. C	102
Safety in	22	10	Installation in kitchen baggage cars	72	66
Supplies for	App. B	93	Installation on kitchen trucks	61	52
Disinfecting mess gear	App. B	96	Packing for return shipment, kitchen baggage cars	75	75
Dry stores, condition inspection of	33	19	Field Ration A	4	2
Dunnage:			Field Ration Issue Slip (DA Form 10-260):		
Construction of	34	22	Delivery of supplies	25,77	13,77
Use in tropics	92	84	Quantity and weight check	33	19
Early meals, serving of	38	30	Field ration messes:		
Eating utensils:			Meal rates in	6	4
Improvised utensils	App. D	139	Receipt of supplies	25	13
Plastic utensils used in kitchen cars	85	81	Sources of supply	25	13
Emergency supply points, use of	80	79	Types of	5	4
Engineer personnel, responsibility for:			Fire extinguishers:		
Buildings	7	5	Importance in arctic	102	90
Maintenance of kitchen equipment	11	6	In field range accessory outfit	App. C	102
Utilities	7	5	In garrison mess	23	12
Equipment:			In kitchen baggage car	71	64
Field messes	49	41	Packing for return shipment....	75	75
Equipment in forward areas	61	52	Placement of	72	66
Equipment in rear areas	55	42	Use of	74	74
Garrison messes:			Installation on kitchen truck	61	52
Basis for issue	10	6	Fire, prevention of:		
Cleaning of	42	33	In field mess equipment	App. C	102
Inspection of	45	36	In garrison messes	23	12
Replacement of	12	7	In kitchen cars	74	74
Responsibility for operation and maintenance of	11	6	In the arctic	102	90
Kitchen baggage cars:			First cooks:		
Equipment required	71	64	Duties of	17	9
Improvised equipment	71	64	Shift assignment	36	27
Installation of	72	66	Fish:		
Maintenance of	73	74	Condition inspection of	33	19
Packing for return shipment	75	75	Use in arctic feeding	95	86
(Also see Kitchen cars.)			Floors:		
Troop kitchen cars. (See Kitchen cars.)			Cleaning of	22,42	10,33
			Inspection of	45	36

	Paragraph	Page		Paragraph	Page
Food adviser:			Garbage disposal:		
Advice on reduction of overdrawn meals	27	15	Arctic	101	90
Concern with forced issues	33	19	Desert areas	90	84
Reduction of issue factor	40,41	32,33	Forward areas	64	60
Relationship with mess officer	14	7	Garrison messes	42	33
Responsibility in Army food program	3	2	Kitchen cars	87	81
Food containers, insulated:			Rear areas	57	46
Use in arctic	98	87	Tropics	93	85
Use in forward areas	60	51	Gasoline:		
Use in kitchen cars	71,72,86	64,66,81	Use in arctic	102,103	90
Food packet, survival, general-purpose	4	2	Use in kitchen baggage cars:		
Food preparation:			Issue	78	77
In arctic	95-97	86-87	Safety precautions	74	74
In desert operations	89	83	Storage	72	66
In garrison messes:			Transporting	74	74
Cooks' responsibility	17,36	9,27	Gasoline cans:		
Leftovers	40	32	Kitchen baggage cars	71	64
Inspection of methods	45	36	Placement	72	66
Mess steward's responsibility..	15,36	8,27	Packing for return shipment	75	75
Safety	22	10	Kitchen trucks	61	52
Timing of meals	38	30	Gasoline field ranges		
In tropics	92	84	(See Field ranges.)		
On field ranges and stoves	App. C	102	Gasoline stoves	App. C	102
On kitchen truck	62	59	Use in desert operations	89	83
Food storage facilities:			Germicidal rinses, use in desert		
In arctic	100	89	operations	90	84
In garrison messes:			Grease trap and soakage pit,		
Inspection of facilities	45	36	construction of	57	46
Maintenance of refrigerators....	7	5	Grease traps, inspection of	45	36
Storage of nonperishables	34	22	Griddle and double-barrel oven	App. D	132
Storage of perishables	35	25	Griddle and quick-bread oven	App. D	124
In kitchen baggage car	71	64	Headcount:		
In rear area messes	54,55	42	On troop trains	83	79
In troop kitchen car	66	63	Reporting of	29	15
In tropics	92	84	(Also see Headcount Record.)		
On kitchen truck	61	52	Headcount Record (DA Form 3033),		
Food supplies, safety in handling	22	10	use of	30,38	15,30
Forced-issued items	33	19	Headcounter	20	10
Forward area messes:	60	51	Duties of	30	15
Food preparation	62	59	Heaters, immersion. (See immersion		
Sanitation	64	60	heaters.)		
Serving	63	59	Heaters, space, radiant-type, portable	App. C	114
Use of kitchen truck	61	52	Holiday decorations, use of	43	35
Frozen foods:			Holiday meals, serving of	38	30
Condition inspection	33	19	Ice, issue to kitchen cars	78,80	77,79
Storage	35	25	Ice chest, kitchen baggage cars:		
Use in arctic	97,99	87,88	Construction of	71	64
Fruits, fresh, condition inspection	33	19	Positioning of	72	66
Fuel, issue to kitchen baggage car	78,80	77,79	Immersion Heaters:		
(Also see Gasoline.)			Ban on use in kitchen baggage cars	74,85	74,81
Garbage cans, use on kitchen baggage			Immersion heater for corrugated		
car	71,72	64,66	cans	App. C	118

	Paragraph	Page		Paragraph	Page
Immersion Heaters:—Continued			Meal, combat, individual	4	2
Immersion heater for tank trailers	App. C	120	Preparation on field cooking outfit,		
Use for melting snow	94	86	small detachment	App. C	99
Use in messkit laundry	App. B	95	Use in troop train movements	77	76
Incinerators, construction and operation			Meal planning, arctic	96	87
of	57	46	Meal rates	6	4
Insecticides, storage of	22	10	Meal status of mess	26,27	14,15
Inspection:			Meal tickets, use in rail movements	65	63
By commanding officer	13	7	Meals:		
By mess officer	14	7	Timing of	38	30
By mess steward	15	8	Serving of	39	31
Inspection checklist	45	36	Meats:		
Inspection of subsistence	33-35	19-25	Condition inspection of	33	19
Purpose of inspections	44	36	Delivery of	25	13
Kitchen cars:			Emergency fresh meat diets, arctic	95	86
Accounting procedures	82,83	79	Mechanical equipment:		
Equipment:			Inspection of	45	36
Basis for issue	67	63	Safe use of	22	10
Disposition of	70	64	Menus, troop train movements	77	76
Issue of	68	63	Mess Guest Register (DA Form 3032),		
Responsibility of train			use of	30	15
commander	69	64	Mess keys, responsibility for	9	5
(Also see Equipment (kitchen			Mess officer:		
baggage cars).)			Duties and responsibilities	14	7
Location on train	84	81	Responsibility in equipment		
Subsistence:			replacement program	12	7
Initial issue	77,78	76,77	Mess personnel:		
Supplemental issues	80	79	Duties of	13-20	7-10
Turn-in of	81	79	Responsibility for buildings and		
Use of kitchen cars	65,66	63	utilities	7,8	5
Kitchen cabinet, kitchen truck	61	52	Responsibility for operation and		
Kitchen police:			maintenance of equipment	11	6
Clearing and setting of tables	39	31	Mess steward:		
Duties of	19	10	Conduct of daily meeting	37	28
Number authorized	19	10	Control of overdrawn meals	27	15
Kitchen tents, use of	55	42	Control of plate waste	41	33
Kitchen truck	61	52	Disposition of excess supplies	25,28	13,15
Use in arctic	98	87	Duties and responsibilities	15	8
Use in forward areas:	60	51	Inspection of food supplies	33,34	19,22
Cooking	62	59	Irregular meal hours	38	30
Serving	63	59	Preparation of cooks' worksheet	26	14
Knives, safe use of	22	10	Preparation of ration request	25	13
Ladder, kitchen truck	61	52	Reducing amount of leftovers	40	32
Late meals	38	30	Responsibility for camouflage		
Leftovers:			discipline	59	50
Information on cooks' worksheet....	26	14	Responsibility for making		
Reducing amount of	40	32	inspections	44	36
Use of	40	32	Shift assignment	36	27
Lighting equipment, improvised	App. D	141	Training of personnel	46-49,62	39-41,59
M2 burner unit, use of	App. C	111	Use of leftovers	40	32
Master menu	4,50	2,41	Messhall:		
Meal cards, issuance of	30	15	Cleaning of	42	33
			Improvement of appearance	43	35
			Discussion at daily meeting	38	28

	Paragraph	Page		Paragraph	Page
Messkit laundry	64, App. B	60, 95	Pictures, use of	43	35
Immersion heater for corrugated cans	App. C	118	Plate waste, control of	41	33
Messkit predip	64	60	Poultry, condition inspection of	33	19
Messkits, washing on troop trains	85	81	Quantity check of subsistence	33	19
Midnight meals	38	30	Ranges, inspection of	45	36
Accounting for	30	15	Ration, individual, trail, frigid	4	2
Milk:			Ration request preparation of	25	13
Condition inspection of	33	19	Provision for midnight meals	38	30
Delivery to garrison messes	25	13	Rations, kinds of	4	2
Issue for use on troop trains	77, 80	76, 79	Rear area messes	52	41
Monetary allowance ration	4	2	Camouflage	59	50
Monetary allowance ration system mess:			Food preparation and serving	56	46
Meal rates in	4	2	Garbage disposal	57	46
Use of DA Form 1544	31	17	Kitchen tents, use of	55	42
Use of DA Form 2970	29	15	Layout	54	42
Night lights, use in garrison messes	17	9	Site selection	53	42
Night Meal Pass (DA Form 3035), use of	30	15	Storage facilities	55	42
Nonperishable subsistence. (<i>See</i> Subsistence.)			Water-sterilizing bags, use of	55	42
Notice of Delegation of Authority— Receipt for Supplies (DA Form 1687), uses of	25, 31	13, 17	Refrigeration equipment. (<i>See</i> Food storage facilities.)		
Operational rations	4, 50	2, 41	Request for Issue or Turn-In (DA Form 3122 or 3161)		
Use in arctic	98	87	Issue of accessory items and condiments	25	13
Use in desert operations	89	83	Turn-in of cash for meals	31	17
Use in forward areas	60	51	Turn-in of excess supplies	28, 76, 81	15, 76, 79
Use in troop train movements	79	79	Request for Troop Train Ration (DD Form 482), use of	77	76
Order and Receipt for Direct Vendor Delivery (DA Form 10-47), use of	25	13	Safety handholds, kitchen baggage cars	72	66
Outside area:			Safety measures:		
Inspection of	45	36	In garrison messes	17, 22	9, 10
Police of	42	33	Discussion at daily meeting	37	28
Overdrawn meals, control of	27	15	In kitchen baggage cars	74	74
Packaged items, storage of	34	22	In use of:		
Packet, subsistence, long-range patrol ..	4	2	Field cooking outfit, small detachment	App. C	99
Painting, messhall	43	35	Heater, space, radiant-type, portable	App. C	114
Pastry products, delivery of	25	13	Immersion heaters	App. C	118
Perishable subsistence:			M2 burner unit	App. C	111
Substitution for nonperishable items	28	15	M1937 fire unit	App. C	108
(<i>Also see</i> Subsistence.)			Stove, gasoline, two-burner	App. C	102
Personnel:			Salt, use in drinking water	88	83
Inspection of	45	36	Sanitation:		
Training	46	39	In desert operations	90	84
In field messing	49, 62	41, 59	In field messes:		
On-the-job training	48	39	Forward areas	64	60
School training	47	39	Importance of field mess sanitation	49	41
			Rear areas	57	46

	Paragraph	Page		Paragraph	Page
Sanitation:—Continued			Subsistence:—Continued		
In garrison messes:			Storage of subsistence. (<i>See</i> Food storage facilities.)		
Cleaning procedures	42	33	Types of food used:		
Dishwashing	App. B	93	In desert operations	89	83
Garbage disposal	42	33	In field messes	50	41
Inspection of food supplies	33-35	19-25	In the arctic	95,96	86,87
Mess inspections	45	36	Problems of supply	97	87
Responsibilities of personnel ..	13-16	7-9	In the tropics	92	84
Use of leftovers	40	32	Subsistence Report and Field Ration Request (DA Form 2970):		
In the arctic	101	90	Ration request	25,38	13,30
In tropics	93	85	Other purposes	29	15
On troop trains	87	81	Sunday meals, serving of	38	30
Serving of meals:			Supplies, excess, disposition of	28	15
In desert operations	89	83	Table clearing:		
In field messes:			By kitchen police	39	31
Forward areas	63	59	Safety measures	22	10
Rear areas	54,56	42,46	Table decorations	43	35
In garrison messes:			Tablecloths, use of	43	35
Inspection of serving methods ..	45	36	Tent flies, kitchen truck	61	52
Safety measures	22	10	Tents, kitchen, use of	55	42
Seating control	39	31	Training of personnel:		
Table service	39	31	Field messing	49,62	41,59
In the arctic	98	87	On-the-job training	48	39
In tropics	92	84	By cooks	17	9
On troop trains	85,86	81	By mess steward	15	8
Serving line, cleaning of	42	33	School training	47	39
Serving table, collapsible	61	52	Trombone heater, construction and operation of	App. D	131
Shifts, garrison messes	36	27	Troop kitchen car. (<i>See</i> Kitchen cars.)		
Splashboards, construction of	72	66	Troop Train Ration Account (DA Form 2389), maintenance and disposition of	83	79
Soakage pits, use in desert operations ..	90	84	Troop Train Ration Issue and Purchase Record (DD Form 483), use of	77,80	76,79
(<i>Also see</i> Grease trap and soakage pit.)			Underdrawn meals	27	15
Stain-removing procedures	App. B	96	Underground food box, construction of	55	42
Storage:			Utensil washing and sterilizing unit, construction and operation of	App. D	126
Safety measures	22	10	Utensil-washing facility	App. D	126
(<i>Also see</i> Food storage facilities.)			Utilities, responsibility for maintenance of	7,8	5
Stove, gasoline, two-burner	App. C	102	Vegetables, fresh, condition inspection	33	19
Subsistence:			Water:		
Emergency issues of perishable subsistence	33	19	Use in arctic	94,101	86,90
Forced issues	33	19	Use in desert operations	88	83
Garrison messes:			Use in tropics	91	84
Disposition of excess supplies..	25,76	13,76			
Inspection:					
Nonperishable subsistence	33,34	19,22			
Perishable subsistence	33,35	19,25			
Receipt of supplies	25	13			
Requests for rations	25	13			
Kinds of rations	4	2			
Kitchen cars:					
Authority for drawing subsistence	67	63			
Initial issue	77	76			
Quantity authorized	77	76			
Supplemental issues	80	79			
Turn-in of supplies at destination	81	79			

	Paragraph	Page		Paragraph	Page
Water cans:			Water-sterilizing bags:		
Use in desert operations	88	83	Installation in the field	55	42
Use in kitchen baggage cars	71,72	64,66	Use in desert operations	88	83
Packing for return shipment	75	75	Weapons rack, kitchen cabinet	61	52
Use on kitchen trucks	61	52	Weight check of subsistence	33	19
Water-heating and cooking facility,			Work and serving surface, improvised	App. D	126
construction and operation of	App. D	123			

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